COMPUTERWORLD

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NEWSPAPER

CW Photo by R. Frank

SBS' Linda Zier and Ralph Fairbanks participate in a simulated business conference in Harrison, N.Y. Freeze-frame video (on large screen) shows users in Houston; data on CRT terminal comes from a minicomputer also in Houston.

New Yorkers 'Meet' Texans At SBS Satellite Conference

By Ronald A. Frank
CW Staff

HARRISON, N.Y. — A different kind of business conference took place at the new headquarters of Texaco, Inc. here recently. The conference was held via satellite to resolve a "typical business problem" and it included participants in Harrison and in Houston, Texas.

The communications link between the two sites was part of the Project Prelude experiment being conducted by Satellite Business Systems (SBS) to demonstrate the future uses of satellite technology for data communications and other services [CW, Nov. 21].

The National Aeronautics and Space Administration (Nasa) authorized SBS to use the Communications Technology Satellite (CTS) to conduct experiments to demonstrate the feasibility of using satellite facilities to enhance business communications.

During the one-hour satellite demonstration at Texaco, high-speed data transmission, facsimile, video and freeze-frame video techniques were utilized, over a single integrated satellite channel. A Hewlett-Packard Co. Model 2648A graphics terminal in Harrison displayed data accessed from

(Continued on Page 6)

Equifax Tactics Unfair To Subjects, FTC Rules

By Nancy French
CW Staff

WASHINGTON, D.C. — Equifax Services, Inc., which develops reports about the personal lives of about 20 million Americans every year, has used "unfair and deceptive" practices in developing and disseminating that information, a Federal Trade Commission (FTC) judge ruled here recently.

The information the firm collects and sells becomes part of millions of computerized files that are used by the firm's business and government clients to evaluate applications for employment, credit and insurance.

The unfair and deceptive practices found by the FTC are violations of the Fair Credit Reporting Act (FCRA) and were committed by the firm in the course of investigating individuals' backgrounds.

Among the violations cited in the 300-page opinion, written by FTC Administrative Law Judge Theodor P. von Brand, were: failure to reinvestigate disputed information; disclosure of consumer investigative reports to unauthorized persons; inclusion of adverse information about consumers in reports even though it was outdated; and maintaining a level of production pressure on its investigative personnel that was inconsistent with accurate reporting, thus failing to adopt reasonable procedures to assure maximum possible accuracy in its reports.

Reports' Accuracy Defended

Equifax Services, Inc. and Credit Bureau, Inc. — the latter of which is a nationwide credit bureau that maintains computerized files on about 30 million American consumers — are subsidiaries of Equifax, Inc., which was formerly known as Retail Credit Co.

In a statement, W. Lee Burge, chairman of Equifax, Inc., expressed "strong disagreement" with the FTC ruling in this four-year-old case.

Burge said the judge's conclusions "appear to ignore the high degree of accuracy the company achieves in its reports and seem to be based on isolated instances in which individual employees may have violated company policy.

"Certainly our policies and practices are designed to assure full compliance and fair dealing and to quickly correct individual instances of noncompliance with immediate termination," he said.

Von Brand found that Equifax rated the performance of individual employees as well as branch offices largely on the amount of adverse information they reported.

Consequently, there was considerable pressure on individual employees to produce information that, in the case of insurance companies, for example, would cause them to either decline to write a policy or at least charge higher premium rates.

In addition, von Brand found that

(Continued on Page 2)

Complete System Security Seen as 'Rings' of Defense

By Nancy French
CW Staff

LONDON — Defenses against computer misuse can be grouped into a series of concentric rings much like the defenses of a medieval castle. Ranging from protective elements built into system software to external people-oriented security disciplines, each plays a role in total system security, according to Adrian R.D. Norman, a management consultant with Arthur D. Little here.

Since each method, or "ring," will have its special advocates within an organization, the DP manager must assess their conflicting claims and "assure he does not invest in a $100,000 software package instead of improving programming discipline or build a concrete fortress on an isolated island when a software lock would have been

(Continued on Page 4)

CW Special Report on Supplies and Security follows Page 28.

DP Finds A Home On the Range

By Jeffry Beeler
CW Staff

FT. COLLINS, Colo. — Until recently, few rodeo cowboys knew — or cared to know — much about computers. A typical bronco buster of the old school probably would have defined the word "bit" as an accessory that fits in a horse's mouth and "kilobyte" as a wound inflicted by a rattlesnake.

But calf roping and Brahma bull riding are no longer the simple diversions they were a few years ago, when all a rodeo cowboy had to worry about was saddling up the nearest available mount and hanging on for dear life.

Today, rodeo riding is big business, just like any other professional sport, and as the management and paperwork problems of life in the corral have increased, many cowpokes have discovered computers can be as useful as a pair of chaps or a trusty lasso.

Yes, DP has at last begun to find a home on the range.

One place where computers have recently proven helpful to cowboys is at Rodeo Communications of America (Rocom), a service firm here that specializes in entering competitors in rodeos organized by the Professional Rodeo Cowboys Association (PRCA).

Rocom uses a system that works much like a computerized hotel or motel reservations network. When a professional rodeo performer decides to enter a PRCA competition, he contacts Rocom headquarters by dialing a toll-free telephone number.

One of the company's 30 telephone operators notes the cowboy's name and registration information and forwards it to the data entry department for keying on an IBM 3742 terminal. The information then goes into the computer system, which reserves a spot for the cowboy in the event or events of

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Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529
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Equifax Tactics Judged Unfair

(Continued from Page 1)

Equifax employees were expected to meet quotas that restricted the amount of time they could spend on any one case. Given these circumstances, some employees completed reports by contacting unqualified sources, hurrying through interviews or failing to ask a full range of questions. Some also completed reports without corroborating information as well as falsifying sources when none could be found within the limited work period.

Although falsifying reports was against company policy, it was impossible for management to assure such practices were not going on, the decision said.

Equifax, in its statement, denied the firm's production requirements exceeded the performance that could or should be expected of employees, saying "quality control records plus studies by independent consulting firms clearly indicate otherwise."

Reinvestigation Procedure

As for reinvestigating disputed information, von Brand found that wherever possible, cases in which disputed information was of a subjective nature were assigned to a new investigator who reopened the case without seeing the original report. However, it was not always possible to assign a new investigator.

When the reinvestigation was assigned to the field representative who did the original investigation, he received production credit only if the customer was charged for the reinvestigation. However, the customer was not charged if an error was found in the original report.

The company's policy of not giving production credit in such cases resulted in field representatives' emphasizing information showing the investigator, rather than the data subject, was right.

In many cases, when consumers did not know they were entitled to a reinvestigation of claims — and thus failed to request them — they were not undertaken at all.

Equifax also provided information on consumers to persons whom it had no reason to believe intended to use the information for purposes authorized under the FCRA. This was done through its voluntary follow-up service and its monetary savings program.

Under the voluntary follow-up arrangement, Equifax employees furnished customers with additional adverse information about consumers who were the subjects of prior reports.

Monetary Savings Program

The Monetary Savings Program involved Equifax supplying its salespeople with information about the subjects of previously prepared reports.

The latter reports were used "as promotion devices to demonstrate the value of its reports," according to the findings.

The findings included testimony of many consumers whose rights were denied by Equifax employees. It also contained testimony of Equifax employees about their interviewing and reporting practices.

The decision is being appealed to the full commission by both Equifax, Inc. and the FTC administrative staff, although neither side was willing to detail its claims prior to filing.

Appeals are expected to be filed sometime after Jan. 15, because both have applied for an extension of the 30-day filing deadline. Resolution of the case could take months or even years since after exhausting administrative procedures, Equifax can appeal the case to the federal courts.

Equifax also has been ordered to cease and desist from:

- Misrepresenting the identity of its investigative personnel.
- Misrepresenting the sources of its information and the manner in which reports are prepared.
- Submitting consumer information to persons whom it has no reason to believe intend to use it for purposes permitted under the FCRA or from persons who have not specifically requested such information.
- Using consumer report information as reference information or as a lead in preparing any report other than a consumer report.
- Including information which under the FCRA is considered outdated.
- Inducing its investigative personnel to prepare a certain proportion of consumer reports containing adverse information.

The company was also ordered to conduct semiannual unannounced performance reviews of field representatives to determine accuracy of their reports.

In addition, in cases where adverse information was discovered, Equifax was ordered to include a special report indicating the name of the individual who supplied the information.

- Misrepresenting to any consumer his rights under the FCRA.
- Failing to disclose information in the file to an individual with proper identification.
- Failing within a reasonable period of time to reinvestigate disputed information.

Equifax Loses Maine Battle

AUGUSTA, Maine — A Superior Court here recently rejected a request by Equifax Services, Inc. for a temporary injunction against the state's new credit reporting law.

Justice Lewis I. Naiman's ruling earlier this month frustrated Equifax's efforts to prevent enforcement of the 1977 statute, which limits the sale of personal information by credit companies and forbids the collection of information on an individual's life-style, political affiliation, race, religion or philosophy.

The law was enacted by the Maine legislature in response to citizen complaints that Equifax, gathered information on the sex lives, religious convictions and political activities of those it investigated.

Equifax has argued that the Consitution gives it the right to collect and sell information and that facts about private lives are relevant in evaluating a prospective policyholder's potential risk to an insurance company or employer.

Naiman rejected the company's constitutional claim — a decision that drew praise from the sponsor of the state's credit reporting bill. But at the same time, Naiman invited the firm to test the constitutionality of the new law if it so desires.

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20. Training included	NO	**YES**

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Cowboys Learning 'Bit' Not Just Part of a Bridle

(Continued from Page 1)

his choice and selects a bull or bucking bronco for him to ride. For this service, Rocom charges $3.50 per rodeo.

Thus far, over 10,000 rodeo cowboys have subscribed to the service which Rocom President Bryan McDonald claims is the first of its kind in the world.

Built around a 9K-byte IBM System/32, the system also generates all the necessary paperwork for rodeo organizers, including an alphabetical listing of all the contestants in each competition and a detailed schedule of performances, McDonald said.

When it is upgraded next March to a System/34, the system will even generate PRCA membership rosters, oversee Rocom's billing and automate the assessment of fines against cowboys who fail to appear at rodeos where they are scheduled to compete.

Alternative to Hats

Before the system was installed in January 1976, cowboys entered rodeos through Rocom's lone reservations secretary, who recorded entries for all 600 PRCA events held each year across the country. During a typical working day, the secretary manually took 400 to 500 rodeo reservations, McDonald recalled.

Two days before each competition began, a stock contractor dispatched a field secretary to the host city to record the name of each contestant. A local rodeo judge then drew each name from a cowboy hat to determine the competitors' starting order and later repeated the procedure to select livestock for each cowboy.

On the following day, the contestants called Rocom headquarters to find out exactly when they were to compete and what animals they had drawn.

Under this system, reservations errors were common and clerical tasks like determining starting positions and selecting livestock often took 10 to 12 hours, McDonald said.

For the cowboys, the system also made rodeos difficult to enter because of Rocom's busy telephones. "A cowboy could spend six hours on the phone and never get through to our headquarters," he recalled.

In addition, cowboys often found themselves victimized by misunderstandings that arose during phone conversations between themselves and Rocom's secretaries. "If a cowboy thought he was supposed to compete at one time and a secretary thought he was supposed to compete at another time, he would spend a lot of money to get to a rodeo, only to discover that he had missed his event," the company president said.

Then, when a cowboy tried to explain to rodeo officials why he had arrived late, he had no record of his phone call to prove that he had received inaccurate scheduling information. "It was simply his word against the secretary's, and in such cases the cowboy always lost," McDonald said.

Since the system arrived here, however, most of these problems have disappeared, according to McDonald. For the cowboys, the system has nearly eliminated delays in accessing Rocom's reservations secretaries and has minimized scheduling mix-ups.

It has also discouraged preferential treatment in assigning livestock and thus given each rodeo competitor an equal chance to win.

For Rocom, the system has cut reservations errors and allowed company clerks to perform their random drawings "in a matter of minutes."

Largely because of these benefits, the computer system has received an enthusiastic reception from the cowboys who use it. "They're so nomadic that Rocom has become a kind of home for many of them," McDonald explained. "Often when they're on the road, they'll call us just to say hello."

In fact, the computerized reservations system has proved so popular with rodeo cowboys that the PRCA recently bought the service from Rocom.

"It's the one major thing that's happened to rodeos in the last 40 years," McDonald said.

Complete Security Ringlike

(Continued from Page 1)

adequate," he said.

Norman gave this advice at a recent security conference here sponsored by On-Line Conferences Ltd. of Uxbridge, England. He also provided users with an overall security plan.

Hardware Defenses

Redundant processing — achieved by use of parity bits — assuring the same results each time, is part of good hardware security, Norman suggested.

This is especially helpful in systems requiring "very high accuracy or where the consequences of an error are disastrous," he said.

In the area of telecommunications, Norman advised use of special codes containing large numbers of bits to accompany data sent across communications lines. These help detect the presence of errors and, if chosen suitably, can help locate the error in a long string of characters, he said. Even longer sets of check characters can actually be used to recreate the original message despite an error, he said.

As for software, Norman suggested that the system include a resident security officer who routinely checks the accuracy of the system, the authority of its users and the work it does.

It should also include procedures for recovering from breaches of security, whether they be accidental or intentional, he said.

The software should "identify the parts of the system hardware to restrict applications programs to those parts of the system they are authorized to use."

Secure software prevents one program from reading the contents of another with which it shares main memory, precludes one program from overwriting the files of another and checks to ensure that one terminal is not pretending to be another, he said.

The software also maintains the authorization tables that indicate what information shall be available to which user, he said. "If someone tries to do something he shouldn't, the surveillance system should raise an appropriate alarm," Norman said.

The applications programs can contribute to the accuracy of the system, but in all other respects constitute a threat, not a defense," Norman told his audience of users.

Physical Security

In the area of physical security, locks, bolts, fire detection and extinction equipment, guards and burglar alarms should be normal parts of the system's defense.

When possible, a computer should be located away from hazards such as buildings without proper fire protection, aircraft flight paths and roads with heavy vehicles.

There should be only one access route to the computer room, and emergency exits with panic bars should be openable only from the inside, he said.

As for the other measures aimed at fire and natural disasters, Norman pointed out that safes that prevent magnetic media from being "cooked" are available. To use a safe that will not preserve data against the worst conceivable disaster is merely a "wasted insurance premium," he said.

He also recommended use of hand-operated fire extinguishers to battle small problems so that employees will not be exposed to harmful extinguishing agents in addition to the danger from the fire itself.

As for electronic bugs on transmission lines, Norman reminded users that systems are easy to bug since telephone junction boxes and similar facilities are normally sited and constructed to simplify maintenance, making it "not difficult" for a knowledgeable intruder to install a tap.

'Procedural' Ring

Moving out to the "procedural" ring, Norman emphasized that here, segregation of responsibilities is the key.

Procedures should be followed during system development as well as operations to ensure that none of the systems staff has the opportunity to comprise security. In a secure commercial environment, as opposed to engineering, analysts should be prevented from writing the programs they describe, and programmers at terminals should never be allowed to operate the computer or run programs they themselves have written, he said.

When programs are ready for testing against live data, the tests should be conducted by a group that neither specified nor wrote the programs.

As for limiting the abuse of trust by people with authorized access to computerized information, Norman suggested controlling the amount and classes of personal data collected. Facts remain facts in the environment in which they were collected but they may be inappropriate in the context of the uses to which they are put. Soon this will be controlled by legislation, he pointed out.

No matter how trustworthy you may think an employee is, it is essential that he always be required to follow the rules that have been laid down for the installation.

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U.S. Asks OECD Group on Transborder Data

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The U.S. has proposed that the Organization for Economic Cooperation and Development (OECD) create a body to consider the legal, economic and social issues of transborder data flows.

The first task facing the group would be to develop "guidelines for harmonizing national privacy laws," according to the State Department's Morris H. Crawford, who heads the Interagency Task Force on Transborder Data Flows.

Because as many as 13 European countries have been reported considering laws to restrict the flow of information across their borders, the enforcement of privacy in international DP must receive immediate attention from the OECD group, Crawford said.

If formed, the group would first examine the Council of Europe's draft convention governing international privacy, Crawford said. The 18 members of that council are also members of OECD.

White House Honing Privacy Position

The Privacy Protection Study Commission's final recommendations, released last summer, have undergone close scrutiny by a small team on the White House Domestic Policy Staff, and a Carter Administration position on privacy is expected late next spring.

Congressional interest will dictate which parts of the commission's work receive attention from the legislature and Administration first. At this point, the need for legislation concerning medical records and federal law enforcement access to bank records seem uppermost in congressional minds.

Others involved in developing the Carter Administration's views on privacy include Ron Plesser, former general counsel of the privacy commission, and Henry Geller, former general counsel for the Federal Communications Commission and the President's expected nominee for the new post of Assistant Secretary of Commerce for Communications and Information.

Geller Expected To Fill Two Posts

Henry Geller, who is expected to be President Carter's choice for Assistant Secretary of Commerce for Communications and Information, will also be the administrator of the National Telecommunications and Information Administration (NTIA).

The new administration within the Commerce Department resulted from the President's first reorganization plan, which calls for the merger of the White House Office of Telecommunications Policy with Commerce's Office of Telecommunications.

Geller's actual nomination and confirmation hearings are expected to be made and held by mid-February, sources close to the White House said.

NTIA's initial efforts will emphasize telecommunications. However, October 1978 will see an increase in the Administration's budget, permitting treatment of additional issues, such as transborder data flows, electronic mail, electronic funds transfer and privacy.

Washington Update

Booster of FBI Plan Quits Justice Post

WASHINGTON, D.C. — Peter F. Flaherty recently left his job as U.S. Deputy Attorney General to seek the Democratic nomination for the Pennsylvania governorship.

During the eight months he served as Attorney General Griffin B. Bell's right hand, Flaherty gave the Federal Bureau of Investigation permission to go ahead with its plans to develop a message-switching system.

The acting Deputy Attorney General, Benjamin Civiletti, is expected to be nominated by the White House to take over Flaherty's job permanently.

Administration Staffs DP Revamp Teams

The President's federal DP reorganization project has appointed several people to staff the teams that will examine DP in the government from many viewpoints.

Between 20 and 25 members of the public and private sectors are already "on board," according to Kenneth Allen, a staffer in the Office of Management and Budget's Information Systems Policy Division and a member of the reorganization project himself.

Among those appointed so far are Larry Dreeman, director of corporate information services at the Coca-Cola Co.; Robbin Hough, professor of economics and management at Oakland University; Philip Kiviat, technical director of the Federal Computer Performance Evaluation and Simulation Center; and Israel Feldman, director of the Reports Analysis and Statistical Operations Division at the Department of Housing and Urban Development.

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New Yorkers 'Meet' Texans Via SBS Satellite Experiment

(Continued from Page 1)

a data base stored in an HP 3000 minicomputer in Houston. The data was transmitted at 1.544M bit/sec using high-speed Harris Corp. modems.

HP 3000 systems used at both Texaco sites utilized standard data base and data entry software compatible with the experiment despite the high data rate, an HP spokesman said. The satellite transmissions used the 12- to 14 gHz frequency band with special portable 8-foot antennas built by Nasa.

Since the CTS was designed for experimental use by both Nasa and the Canadian Department of Communications, SBS said the demonstration was not a "preview" of SBS services. However, the frequency range and transmission rate were similar to those of the future services currently being described by SBS.

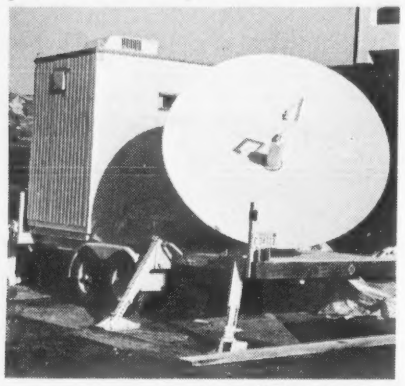
Project Prelude also includes demonstrations at corporate locations of Rockwell International Corp. Montgomery Ward.

In addition to SBS, eight vendors of DP and other equipment and services participated in the project. SBS refused to divulge costs of the satellite capabilities demonstrated.

Earth stations for the 12- to 14 gHz frequencies are not yet available commercially, although the HP systems and much of the other equipment used are generally available.

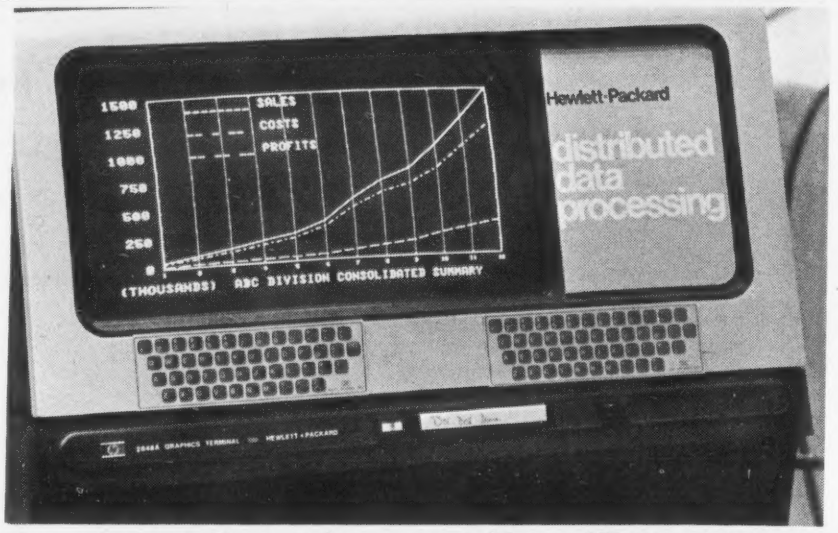
SBS plans to begin providing integrated satellite business services to users in 1981, according to current plans. Project Prelude will conclude early next year after demonstrations have been held at Montgomery Ward. Rockwell International sites were used for demonstrations in November.

At each location, users are being asked whether the demonstrated services would help make their normal business activities more efficient.



CW Photos by R. Frank

This experimental, portable earth station includes a eight-foot antenna constructed by Nasa to operate at 12- to 14 gHz. When such earth stations become commercially available, users will have rooftop access to satellite services.



This graph of typical business data was accessed from an HP 3000 minicomputer in Houston, transmitted at 1.544M bit/sec via satellite and displayed on this terminal in Harrison, N.Y.

Says Dukakis Interfered

Sci-Tek Blames Governor for Lost Work

By Ann Dooley
CW Staff

BOSTON — Sci-Tek Associates, Inc. lost a Massachusetts merit rating board contract — even though its bid was three times less costly than the winner — because of pressure from Gov. Michael S. Dukakis, the firm claimed recently.

"We're in a good legal position to dispute the decision because of the governor's public statements and private interference," Robert Orr, Sci-Tek spokesman, contended. "But we decided it wasn't in anyone's best interests to stop the procurement."

Sci-Tek's allegations stemmed from a recent statement by Dukakis that the company should not be involved in any state business. That statement was made after a state Attorney General's investigation cited Sci-Tek for improper conduct in another recent contract award — a $23 million Administration and Finance facilities management agreement [CW, Nov. 14].

Work in Mid-Stream

Sci-Tek had been working under a no-bid contract for the last six months installing the merit rating board computer system. "The company developed the system and could have simply continued with operations, whereas any other company would have to undergo an orientation period," Orr said.

Sci-Tek was ranked fourth out of seven contenders in the technical assessment phase of the bid evaluation process, but its cost proposal was three times less than that of Control Data Corp., which was awarded the contract.

All the reasons for the decision have not been disclosed yet, according to Orr, who added, "We can't say anything for a fact, but there are rumors" that Dukakis interfered.

"We hope there won't be continued problems with state contracts, but only time will tell," he said.

Denying any government interference, the governor's press secretary, Alan Raymond, said the contract award was made by merit and "the governor was not in touch with the selection committee at any time."

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U.S. to Draft Stand on Private-Line Charges

By Edith Holmes
CW Staff

WASHINGTON, D.C. — U.S. international carriers and multinational DP companies will meet this week to hammer out a U.S. position on efforts by European and Japanese administrations to end flat rates for private communications lines.

Representatives from General Electric Co., Control Data Corp., TRT and RCA and a member of the Commerce Department's Office of Telecommunications will be among those meeting at the Federal Communications Commission (FCC) on Thursday, Dec. 29 to draw up a U.S. contribution for Geneva meetings of the Consultative Committee on International Telephone and Telegraph (CCITT) scheduled for late April and early May.

The Italian government first suggested an end to flat-rate charges for transparent, leased circuits last February. The Italian proposal that the lines be priced according to the volume of messages sent over them gained support from several European countries and from the Japanese government during the May 1977 CCITT meetings [CW, May 16].

The U.S. National Committee of the CCITT, led by Earl Barbely of the FCC, registered its disapproval of Italy's idea during those meetings.

U.S. DP companies fear their leadership in offering DP services to the rest of the world will end if pricing for communications lines becomes volume-sensitive, drastically increasing international communications costs, Brendon McShane of GE said during a Dec. 15 meeting of the U.S. CCITT committee. He estimated the U.S. has 90% of the DP business abroad.

While they are more sympathetic to foreign administrations' desires to realize more revenue from their public communications networks, the U.S. international carriers do not want to lose the U.S. DP companies as customers abroad. The carriers do believe, however, that flat-rate charges must be phased out eventually.

C&W Contribution

Citing a contribution to the CCITT from Cable and Wireless Ltd. (C&W), John O'Boyle of ITT Worldcom called it "one of the better expressions of the worldwide feeling that flat-rate charges must be phased out." He told the committee he "would bet on an end to flat rates for private lines as the reality of the 1980s" and urged an acknowledgement of the fears the rest of the world has.

A milder variation on the Italian theme, the C&W contribution stated that "the major difficulty which has arisen in recent years with this method of charging [flat rates] has been the use of dedicated customer leased circuit facilities by users other than the customer."

The European and Japanese governments specifically fear that U.S. DP companies lease private lines from them for a flat rate and then turn around and use the communications channels, not for data processing, but as ordinary message conduits, members of the U.S. CCITT committee said in interpreting the C&W contribution.

Volume-sensitive pricing suggestions stem from the concern of foreign administrations that public traffic on their communications systems is being eroded through the actions of U.S. firms, C&W suggested, urging that the CCITT study this particular concern.

C&W would not support the Italians' reasons for wishing to eliminate flat-rate charging — that such pricing methods are out of date and that their original purpose was to relieve traffic pressure on Telex services.

The firm added the ominous note, however, that while it "would be unable at present to support any change in the monthly flat-rate charging principle as applied to customers using leased circuits for their own traffic," C&W would be interested in a study to refine the flat-rate system by examining the voice vs. data and the various speed relationships of leased circuits.

GE's McShane believes that the foreign administrations may try a "two-step" move to volume-sensitive pricing for private lines. The first step would be to price lines according to speeds.

Speed-sensitive pricing is already under way in Japan, McShane said, pointing to a decision earlier this month by the Japanese Ministry of Posts and Telecommunications to raise international voice-grade leased circuit rates as requested by the Japanese carrier, KDD.

Effective in April, KDD will abolish private-line service and establish speed-sensitive rates. Using prices of the 2,400 bit/sec line as a base rate, KDD will charge 10% more for 4,800 bit/sec and 20% more for 9,600 bit/sec lines.

KDD originally asked the Japanese ministry to approve increases in prices by 30% and 60%, respectively, for these higher speeds.

The Japanese have also offered discounts of 5% where six or more alternate voice data (AVD) lines are leased by a single customer. The monthly charges for leased telegraph services have also been reduced substantially, A.E. Schuamberger of RCA Globcom added.

By asking foreign administrations to document the problems they've had with DP firms, the U.S. has an opportunity to shape any study of these issues, R.F. Sabacek of TRT suggested.

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IBM Seeks Two Trials in Catamore Round II

By Molly Upton
CW Staff

PROVIDENCE, R.I. — The second trial of IBM vs. Catamore Enterprises, Inc. should be separated into two trials, according to a motion filed by IBM.

In its petition to the U.S. District Court for the District of Rhode Island, IBM asked for a separate trial of the issue of whether the 1969 written agreement between the two firms for IBM systems engineering services (SES) can be voided by Catamore and, if so, whether the contract was rescinded duly and in a timely manner.

At issue is Catamore's claim that fraud by IBM voids the SES agreement and its limitations.

SES Agreement

The SES agreement indicates it supersedes all other agreements and also carries with it a statute of limitation of one year, which the appeals court cited in ordering a new trial.

The appeals court's order for a new trial overturned a jury verdict ordering IBM to pay $11.4 million in damages and Catamore to pay $68,453 in back rent.

IBM had sued the jewelry firm, a first-time user, for the rent and Catamore countersued, charging IBM with breach of contract, breach of warranty, fraud and negligence.

If IBM's claims are determinative, then splitting the trial issues will have saved all concerned much time and effort, IBM said.

Catamore Objects

In its own brief, Catamore objected to the separate trial, asking for more time in which to formulate its reply. The jewelry firm stated a separate trial and the resulting multiplicity of issues will only further protract the matter and waste court time and resources.

The Catamore brief also stated Judge Francis J. Boyle had indicated his intention not to order a separate trial on any issue if either of the parties objected.

IBM contends that issues in the initial trial are relatively simple to comprehend and rule upon. Thus the separate trial would "substantially reduce the grave risk of jury confusion inherent in a trial on all the issues herein involved," the petition stated.

Catamore acquired a System 360 from IBM and engaged the firm to aid in systems design, initially through oral agreements and later through the written SES agreement.

IBM said in its petition that "the court will appreciate that Catamore's argument amounts to nothing more than a contrived and wrong reading of a document, attempting to twist 'system design for production control' into an imagined promise of production control system, an entirely different thing by common understanding and admission."

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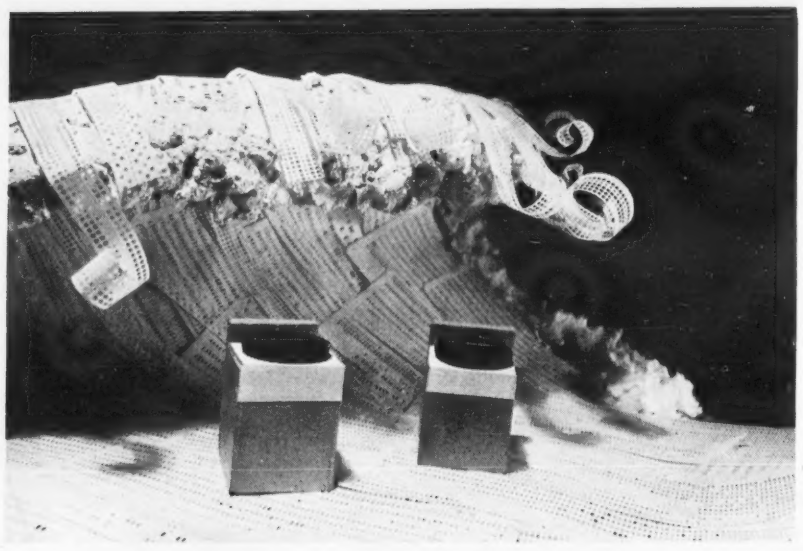

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Firms Tell Why They Said DP Jobs Difficult to Fill

NEW YORK — About 24% of the firms participating in a recent survey reported that DP jobs are among the most difficult to fill [CW, Nov. 21], but they didn't say why or what they are doing about it.

Now that information is available, according to Deutsch, Shea & Evans, the human resources consulting firm that conducted the survey.

Why are DP jobs hard to fill? The demand for programmers and systems analysts, like engineers and scientists, exceeds supply, for one thing. For another, qualified people are not available at the right price. Further, the turnover rate is high because DP skills are highly transferable to other companies.

How are companies tackling the problem?

About 72% of the survey sample answered this question. Fifty-four percent said they are increasing their recruiting efforts through more general recruiting (15%); college recruiting (11%); advertising (11%); other techniques (12%); and by increasing the geographic range of their recruiting efforts (5%).

Further, 20% reported internal efforts such as training, career development and upgrading existing employees. Seven percent said they are increasing salary offers, 3% reported lowering standards and 10% reported a variety of other approaches, such as redesigning jobs and paying relocation expenses, for example.

Split on Intervention

As for their opinions on various external measures such as federal government intervention, 50% of those surveyed answered that the federal government should take no action, and 23% felt it should.

Those that invited government action suggested tactics as tax credits and incentives for businesses. Others suggested the need for more government contracts as a means of building employment.

Regulatory agencies and regulations came under fire by the group, as did welfare and similar programs, the researchers said.

The questionnaire was mailed to 902 companies, and the first 201 responses (22%) were tabulated, the consulting firm said.

About 45% of the responses were from organizations with fewer than 1,000 employees, and 55% were from larger ones. Responses were from predominantly business and industrial organizations.

Calendar

Jan. 23-25, Washington, D.C. — **Course in Tape/Disk Librarian Functions**, sponsored by the U.S. Civil Service Commission Bureau of Training. Contact: Director, ADP Management Training Center, Bureau of Training, Attn: TOA, U.S. Civil Service Commission, 1900 E. St., N.W., Washington, D.C. 20415.

Jan. 23-27, Valparaiso, Chile — **Fifth Panel Discussion on Computation Topics**, sponsored by Chilean Association of Information Treatment. Contact: Aldo Migliaro, Director, Centro de Computacion, Universidad Catolica de Valparaiso, Casilla 4059, Valparaiso, Chile.

Jan. 30-Feb. 1, Washington, D.C. — **Data Processing Technology**, sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Dept. PR, AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

Jan. 30-Feb. 2, New York — **Forms Design Course**, sponsored by American Management Associations. Contact: American Management Association, The American Management Associations Building, 135 W. 50th St., New York, N.Y. 10020. Also being held March 27-30 in Chicago.

Jan. 31-Feb. 2, New Orleans — **IWP Spring Symposium**, sponsored by International Word Processing Association. Contact: Rudolph Lang, Prestige Expositions, Inc., P.O. Box 3084, Stamford, Conn. 06905.

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Regional Processing Centers Urged

Competition in Medicare Services Held Lacking

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Too little competition exists in the data processing services provided by the private sector for the federal government's Medicare program, according to a report recently delivered to the U.S. Health Care Financing Administration's (HCFA) Bureau of Medicare.

The firms that process bills and claims for the nation's elderly and disabled under Medicare now perform full facilities management for the government. More competition would result if the government owned and monitored regional processing centers and then let the private sector run them, the study performed for the bureau by Systems Architects, Inc. (SAI) concluded.

Before the government regionalizes its Medicare processing, however, it must first develop long-range DP policies, including planning, performance standards and management control procedures, the report said.

These policies should be designed to bring Medicare processing in line with a number of federal DP guidelines — including the stricture that services provided by the private sector must be competitive, the study added.

At present, two firms — The Blue Cross Association and Electronic Data Systems Federal, Inc. — dominate the contracting for Medicare DP, according to the report.

Regional Concept

Regional processing of Medicare claims or bills would involve decentralized data entry beneficiary services and provider — such as physician or pharmaceutical — services, according to SAI.

The concept calls for the federal government to "centralize Medicare DP using distributive processing techniques." Both the hardware and software involved at all sites would be owned by the government.

In order to regionalize, the government must assume and maintain overall management responsibility for the Medicare program's DP policy, SAI added.

Each regional processing center would be a site used by more than one of the organizations that have contracted with the government to process bills or claims under Medicare. Those intermediaries that process bills under the Health Insurance Program (Part A), which serves the aged, and carriers that handle the claims received under the Supplemental Medical Insurance Program (Part B), which aids the disabled, would be responsible for performing the DP functions associated with Medicare claims processing, the report suggested.

Pilot Program Urged

In its survey of current Medicare claims processing systems, SAI concluded that clerical and data entry functions should remain decentralized and that claims-processing operations should continue to be accomplished by the private sector.

A regional processing center experiment should be performed, but only after the weaknesses of standard reporting, hardware and software acquisition and DP policy that plague the present Medicare system have been resolved, the report said. The prototype center should be undertaken in particular to determine what cost savings could be gained from regionalizing Medicare processing and to test new management control standards and performance reporting policies.

Finally, SAI recommended the Medicare Bureau establish a task force to document requirements for combining Health Insurance Program and Supplemental Medical Insurance Program data into a single data base for DP purposes.

Called the Medicare Regional Processing Feasibility Study, the four-volume report cost the federal government $235,506 to produce.

In its quest to determine the feasibility and cost-effectiveness of consolidating Medicare workloads by using regional centers for claims and bill processing, SAI collected data on the way intermediaries and carriers currently process the nation's health benefit programs for the aged and disabled.

The contractor also studied the feasibility and economics of standardization and tried to come up with a model of Medicare run by regional processing centers.

The many reporting inconsistencies of the program made it impossible to quantify the actual requirements of a regional processing center, SAI said. The contractor could "only observe the qualitative differences between the various types of systems and methodologies used by various intermediaries/carriers.

"Data that would enable us to determine the cost to operate, maintain and enhance the various systems in operation today and extrapolate savings to a new regional processing center environment is not available," SAI added in its report. Consequently, it is extremely difficult to determine the savings that could result from regionalization.

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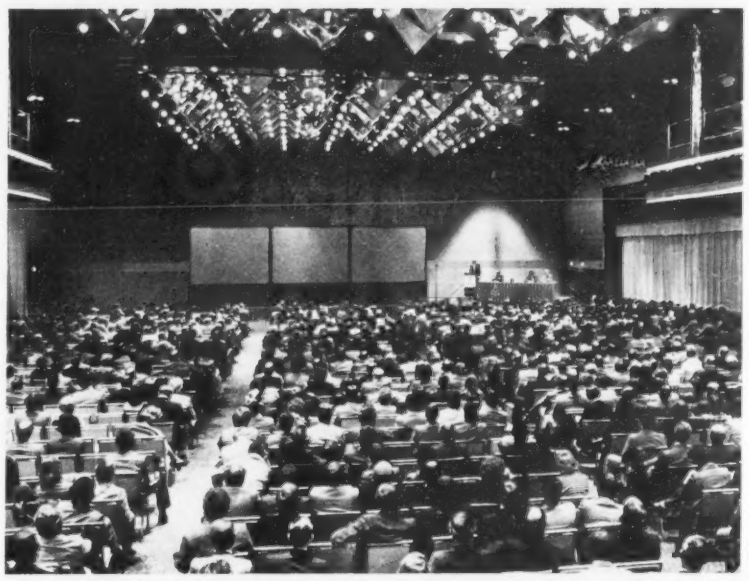

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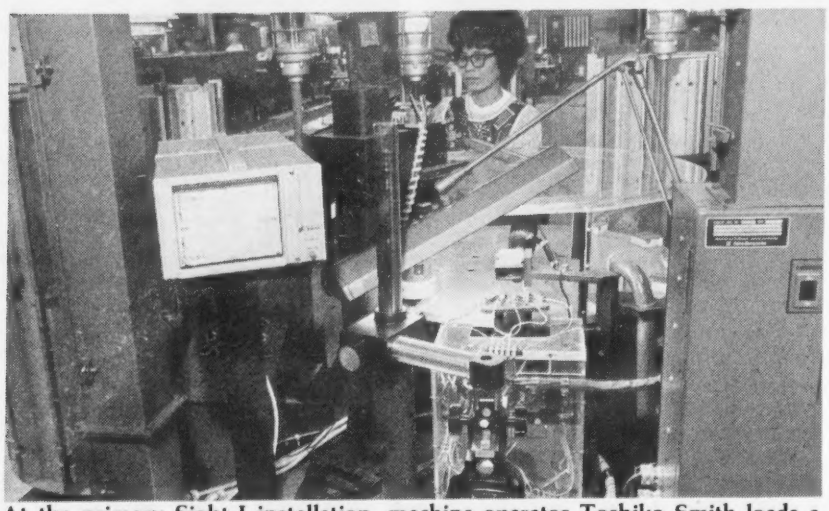

At the primary Sight-I installation, machine operator Toshiko Smith loads a supply tray for the inspection machine. The inspected and accepted output assemblies move in metal cassettes to the next production station.

System at GM 'Sees,' Inspects Ignition Chips

By Catherine Arnst
CW Staff

KOKOMO, Ind. — A computer that can "see" is being used on the assembly line at General Motors (GM) to locate and inspect the integrated circuit chips used in the ignition systems of GM cars and trucks.

Sight-I, installed in January 1977, is said to be the first industrial vision system of its kind to go to work on a U.S. automotive production line. It was developed by Dr. Michael L. Baird of the computer science department of GM's Research Laboratories.

"I've developed a program that sharpens the sight of a computer so it can rapidly and reliably find nonoverlapping parts — even on visually confusing surfaces like conveyor belts which tend to camouflage the parts' outlines," Baird said.

The system is built around a Digital Equipment Corp. PDP-11/45 minicomputer with 16K memory and a solid-state diode array television camera. The image is picked up by the camera and converted to a mosaic of minute squares in varying shades of grey.

Within one second, the computer can fix the location of the chip by determining the coordinates of its four corners, for example. It can then inspect the chip for defective assembly characteristics, looking for such things as a chip that is tilted too much for automatic test equipment, off the edge of the heat sink or perhaps missing a corner.

Image Enhancement

The system processes about two chips per second in daily production, according to Baird. Before the Sight-I, GM used a human operator to visually determine the location of the chip, inspect for any defects and manipulate a set of electrical test probes over the base and emitter areas of the chip.

Using the digitized data from the camera, the computer is programmed to work through a sequence of image enhancement operations to silhouette the part and emphasize its outline.

The intensity of the squares along the edges of the object is intensified. Then the data is smoothed by erasing the false edges caused by irregularities in the background and by inserting more edges along the object boundaries.

Further operations ensure that the boundaries of all the objects are closed and that any holes inside the connected parts are filled. From the well-defined outline, the computer can calculate the position and orientation of the object on the conveyor belt, Baird said.

During the inspection process, the chip assembly itself is not moved; instead, an electrical test probe mechanism is rotated into the proper position, based on information received by the camera. A "relational template matching" approach is used for location determination and a contrast detection scheme performs the inspection task.

A set of computer programs then performs the vision task in five steps. First, the object is digitized to obtain a 50 by 50 image of the assembly. The program then determines the approximate location of the chip on the heat sink through gradient direction analysis. Possible corners of the chip in the image are located.

The computer then determines the actual four corners of the chip; finally, inspection for chip integrity is done by looking for uniform contrast around the chip edges.

The automated system has increased chip quality and throughput, Baird said. The time and costs required to develop a workable system were kept within the limits set in 1974, when the project was started, he added.

The Sight-I inspection system was developed cooperatively by the General Motors Research Laboratories, GM Manufacturing Development and GM's Delco Electronics Division here in Kokomo.

DP Helps Test Engineers In Concorde Certification

LONDON — The British Aircraft Corp. (BAC), builder of the Concorde supersonic transport, used a computer to bring the Concorde through its certification program and qualify it as airworthy.

According to a BAC spokesman, the system monitored more than 3,500 instruments that measured such variables as pressure, temperature and stress during test flights.

An ICL, Inc. 1904 analyzed data amounting to several million characters per test flight and converted it to actual measurements for use by test engineers, the spokesman explained.

The 1904 replaced an IBM 370-based system that used a GEC 9030 computer for ground replay and basic data analysis. The original system was set up to handle the comparatively low volume of flying planned for the Concorde.

However, it proved to be inadequate to bring the aircraft through the certification program on schedule, the spokesman explained.

The present system includes 128,000 words of core storage, 18 interchangeable 30M-character disks, two disk controllers, six 160,000- and two 60,000 char./sec magnetic tape drives, several printers, card and paper tape readers, two on-line graph plotters and three teletypewriter terminals.

The system usually processed six to eight jobs concurrently with programs varying in size from 5,000 to 100,000 words. The computer operates under the George III operating system, which provides control of both batch and on-line jobs with little operator intervention, the spokesman noted.

Two teletypewriter terminals are used on-line for program development and maintenance while a third maintains the aircraft's instrumentation schedule, he said.

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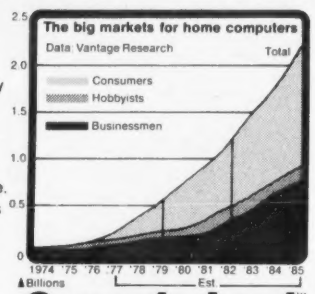

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Result in Hasty Decisions

Vendor Ploys Can Trap Users, Report Warns

By Brad Schultz
CW Staff

WINTER PARK, Fla. — Vendors often trick users into buying more equipment than warranted and unknowingly committing themselves to future concessions.

Marketing personnel book a lot of business without having to negotiate contracts; they use "price protection" or "price increase coming" ploys that trick users into overbuying before the price rise hits, according to Issue 5 of the *Computer Negotiations Report* (CNReport).

Vendor representatives inform prospects that a price rise is coming and suggest that equipment needs for the next year or two be anticipated and the material ordered now, the report said.

The pitch can be strengthened by convincing users that this anticipatory approach ensures higher priority on the vendor's production and delivery schedules, the report said, adding that vendors can assuage user hesitancy by noting that the price-protective agreements can be cancelled at any time — or within 90 days.

Many users are convinced by this "price protection" ploy and buy a variety of superfluous items — most frequently peripherals, additional core memory and upgrade configurations — and some even contract for an entire new system, *CNReport* continued.

"The user frequently signs the price protection contract without any serious negotiations over price or terms. In most cases, the user simply signs the vendor's standard form agreement, without additions or deletions. Needless to say, the user leaves important legal, financial and substantive concessions lying on the table," the report said.

For example, it said, the user often ends up with a high-cost rental agreement when a third-party lease is preferable.

Incomplete Review

The contract often is not properly reviewed by user senior management, with disastrous results if the transaction "blows up" or is learned about indirectly by a board member at a later date, the report indicated.

Cancelling the contract may be much more difficult than implementing it, the report warned, adding that the contract may not even mention cancellation or require the vendor to permit it.

Moreover, "if the user decides to change vendors or take other action against the incumbent vendor, the latter may resurrect the price protection contract and threaten to enforce it."

The price protection gambit is generally used when user and vendor are not negotiating on some other transaction. The related "price increase coming" ploy is often used when negotiations are in progress, according to the report.

This entails rushing the user into overbuying while effectively ignoring considerations other than the impending price hike. Typically, a vendor marketing representative tells the user the hike can be avoided if the contract is signed by a certain imminent date; in a panic, the user signs without pursuing other points of greater value.

CNReport recommends that users follow two rules in resisting these ploys: "never sign a 'price protection contract' without full review, approval and negotiations" and "do not be rushed into acquiring ... when the vendor seems to be dangling a carrot."

Trade Bank System Lets Members Barter for Products and Services

By Tim Scannell
CW Staff

SCOTTSDALE, Ariz. — An idea born 12 years ago when L. David Fox decided to trade draperies for needed dental work has evolved into an association of more than 300 business members with transactions totaling upwards of $1 million annually.

Fox created a computerized trade bank whose members can barter among themselves for products and services without having to exchange money. Members of the National Businessman's Association, Inc. (NBA) are issued their own trade credit checking accounts, which include check blanks and deposit slips, and are then given an account number, Fox said.

After that, transactions are carried out among members, through the NBA. The system's operation is not unlike that of an ordinary bank except for the absence of money, he explained.

The basic principle of the NBA, that of conserving money, was one of the main reasons for its initial acceptance and growth, Fox noted.

"A lot of people like to trade and anytime a merchant can trade what he has for what he wants, it conserves his cash. It seems that most people today are long on products but short on money. If they take their product or service and use that as their medium of exchange then they don't have to have money, really," he explained.

Transactions in what he calls the "NBA barter-bank" are accomplished this way, he said. "Member A goes to Member B and, let's say, buys a set of tires from him. Well, he pays him whatever his retail price is but he writes him a trade credit check for it.

"Member B then fills out a deposit slip ... mails it in for deposit (to the NBA) and the computer credits Member B's account and debits Member A's. Member B then has these trade credits in his account that he can then spend with any of the other members in the entire association," Fox stated.

Currently, the NBA contracts for computer services from a local business that also happens to be a member of the association, Fox said. Its installation uses a Prime Computer, Inc. 300 system with 64K of memory and a 12M-word storage capacity, a spokesman for the firm said.

As with any business or venture, the Internal Revenue Service (IRS) must be notified about income of any sort, a representative of the IRS said. "As a general rule, in instances where no money changes hands or there is only a partial exchange of money, the measure is the fair market value of what you receive over what you give up," any excess being taxable income, she explained.

The NBA does not accept the responsibility of reporting a member's income to the IRS, Fox said. It does send each member a monthly statement which includes such information as from whom he purchased, the date, check number, firm name and amount of purchase as well as

(Continued on Page 12)

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Creates Too Much Waste

MIS Called 'Disease' of Centralized Systems

By Esther Surden
CW Staff

ANAHEIM, Calif. — Centralized systems suffer from management information systems (MIS), a "management disease" whose symptoms are voluminous planning reports, much wasted management time, millions of dollars down the drain and eventual disillusionment of users, according to Jacob Sternberg, president of Conversational Systems Corp.

Speaking about distributed processing at a recent conference here, Sternberg continued to say that most centralized DP departments as they stand today cannot implement local systems well.

The DP establishment "no matter how competent," is removed from the business structure of the company. In contrast, the distributed structure satisfies local needs, he said.

Local systems are often designed by a Ph.D. sitting in an office far removed from the local operation who learned applications from a book and then generated those applications centrally.

Or else, the local unit requests certain reports from the central department. The central DP area then requests the user to prepare a detailed functions specification, which Sternberg described as a contract between the user and the implementer.

The DP department needs this because every new system put on the large CPU must be checked for its impact on every other procedure and application on the system.

The result of all this checking, however, is a large backlog, long delays for the user and high costs, he said.

Further, the packages that result from this procedure are often generalized to accommodate all eventualities. Generalized packages can be equated to homogenized milk, Sternberg asserted; "you don't get the cream." The packages cannot account for local diverse needs.

With local implementation of systems, however, planning can be simplified, he said. Applications only have local impact, so users can "try and fail and not affect the business."

The remote areas do need some central coordination, he acknowledged. Standards for the transmission of data to the central site, for example, could be developed by the central site, he said.

The other function of the central site is to monitor adherence to its standards. Standards provide uniformity across all systems, eliminate a lot of documentation, and make unnecessary a lot of the meetings between designers and users that now take place.

Distributed systems could be implemented more easily through use of what Sternberg called plug-to-plug compatible software. Comparing software used in distributed systems to plug-compatible peripherals, he noted that the peripherals had two requirements — they had to adhere to a standard and they had to be pluggable without modification. So software that adheres to the standards set by the user can be plugged in and out of a software system to develop applications in a building block manner, he explained.

Storage Media Sold Via Direct Mail

By Joseph V. Popolo
Special to CW

The advent of the low-cost computer has left the minicomputer manufacturer faced with the problem of servicing what is dubbed the "after market."

Servicing implies two roles — equipment repair and providing supplies and media. The first role has been well addressed but up to a year ago, manufacturers chose not to become suppliers of media and consumables. With customers investing $100,000 and up in hardware and software, media dollars seemed insignificant.

But the installation of small computers has increased as system prices have decreased and the supply market has changed accordingly.

A survey of mini users conducted by *Modern Data* earlier this year determined the typical user spent $500 to $1,500 on all his consumable supplies and media each year. Because of this low figure, using the salesman who sells the hardware to sell the follow-up products is not economical.

Many manufacturers simply marked up products four or five times their normal market price to discourage sales without appearing to indicate they weren't supporting their customers.

One of the few manufacturers attempting to meet changing customer needs is Digital Equipment Corp.

With an estimated 50% of the installed U.S. minicomputer base, DEC has a captive built-in starting market for its media products. Instead of leaving the market to business and office supply companies, DEC decided to reach users through the direct mail approach.

Having a single source for products such as disk cartridges, floppy disks, cassettes, binders, ribbon and paper is a definite plus for the user. The customer can expect to be adequately serviced by a direct mail firm which can provide the variety of products he needs and at the same time give him quick delivery.

DEC apparently believes in the success of its new distribution method since it has already put out two additional catalogs.

There are several regional firms, one on the West Coast and another in Connecticut, using the direct mail approach for mini users. There are other firms selling nationwide, but only to large computer users.

But the users will be exposed to some hazards in the direct mail approach. This is especially true with magnetic media products. Many manufacturers place their own labels on magnetic tape, cassettes and flexible disks even though they come from a variety of sources.

This is not the only area the user will have to guard against. Hassling with a direct mail firm, be it erroneous billing or a leaderless cassette from a guaranteed compatible Brand "X" supplier, the user will face some headaches. It is probably best to stick with name brand products, pay the differential and save lots of problems. The relative differential between a $16 top-of-the-line name brand magnetic tape and a $10.95 special is worth a lot more in potential loss of data records.

Popolo is president of Misco, Inc., a minicomputer supplies company.

CDP Exam Course Set

PHILADELPHIA — A refresher course for candidates planning to take this year's examination for the Certificate in Data Processing (CDP) will be offered here on six consecutive Saturdays.

Sponsored by the Data Processing Management Association (DPMA) chapter here, classes will be held each Saturday from Jan. 7 until Feb. 11.

The fee is $50 for members of any DPMA chapter or other organization in the Institute for the Certification of Computer Professionals. Nonmembers will be charged $50.

Applications should be returned by Dec. 31 to William R.Patterson, CDP Refresher Course, Philadelphia Chapter, DPMA, P.O. Box 2177, Philadelphia, Pa. 19103.

System Bypasses Cash

(Continued from Page 11)

what, if anything, was purchased from him.

The NBA, having recently celebrated its second anniversary, is still very young, Fox noted. Its membership includes doctors, dentists, attorneys, certified public accountants, restauranteurs, clothing and toy merchants and contractors. There is even a veterinarian and a vasectomy center included in the association "... so you can get your cat spayed or your husband fixed," Fox said.

The NBA also offers such group benefits as legal counseling, group insurance, seminars, a directory and a monthly newsletter, Fox claimed.

Besides promoting a sort of camaraderie among its members, the NBA also stimulates business, Fox noted. If a member wants to buy a suit of clothes, he will more than likely do business with a fellow member even if that means traveling across town to do it, he said.

Membership in the NBA costs $136 with the member receiving $100 in trade credits. Semiannual dues are then $36 and the NBA makes a 10% service charge on transactions — 3% on the trade credit portion and 7% on the cash portion, Fox continued.

Fox hopes to establish NBA branches in Dallas, Houston, Oklahoma City, Denver and Salt Lake City, he said.

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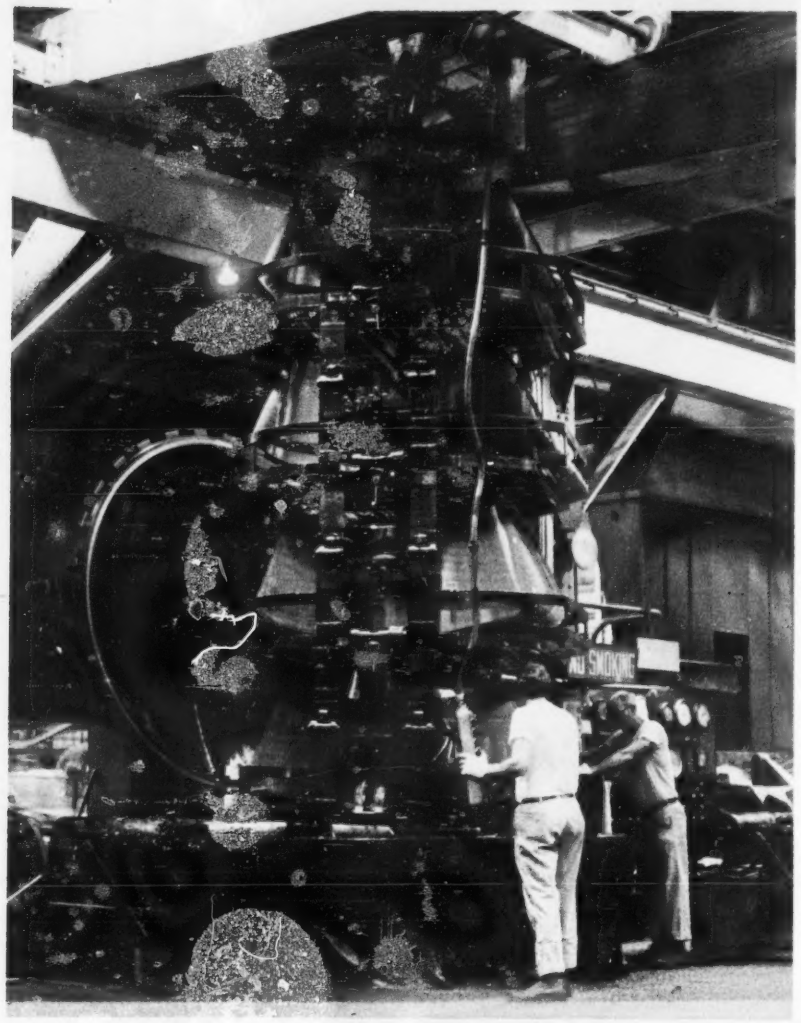
Notes and observations from IBM that may prove of interest to data processing professionals



Libbey-Owens-Ford Manages Rapid Changes with DL/1

"Our product now is technically more sophisticated and highly individualized, requiring many more stages of production. The part number count has zoomed from 400 to 8,000 and we're adding 200 new items a year."

The product is automotive glass. The speaker is Robert Whittington, executive director of management information systems for Libbey-Owens-Ford. He is describing why LOF turned to Data Language/1 (DL/1) for data base management on its IBM System/370 Model 158 at Toledo, Ohio. To control a network of IBM 3277 Display Stations, which handle online transactions from the factory floor and throughout the plant, LOF uses the Customer Information Control System/Virtual Storage (CICS/VS).

"We're constantly called upon for more variations of the product," Whittington notes, "such as embedded antennas or defrosting elements, tinted glass, edge bands and etched designs. In addition, production and delivery must be precise because our customers don't carry inventory. We ship directly to their assembly plants and must accept order changes up to the last minute.

"All this means constant rework of our Production Information System," Whittington adds. "Before we had DL/1, a little thing like changing from seven- to eight-digit part numbers would require extensive reprogramming. Because DL/1 protects the program from any changes in data structure, we have complete device and data independence. Now we can direct the computer to track an entire new sequence of production stages simply by making an entry in our DL/1 data base. And the creation of data entry editing routines to catch errors is simplified.

"Through inquiry into the DL/1 data base, management and production control people can obtain a better picture of what's happening on the plant floor. The scheduling department can spot potential trouble before production is seriously affected and we consistently achieve better schedule compliance. Now we handle increased product complexity and volume without adding people to the scheduling department.

"We can readily apply the data base developed under DL/1 to such management functions as budgeting, cost control, and financial planning. But most important, we do more than cope with changes. We're able to manage them."

This heat-treating machine, called an autoclave, bonds auto windshield laminations. DL/1 helps Libbey-Owens-Ford control production to meet demand for a fast-growing list of part numbers.

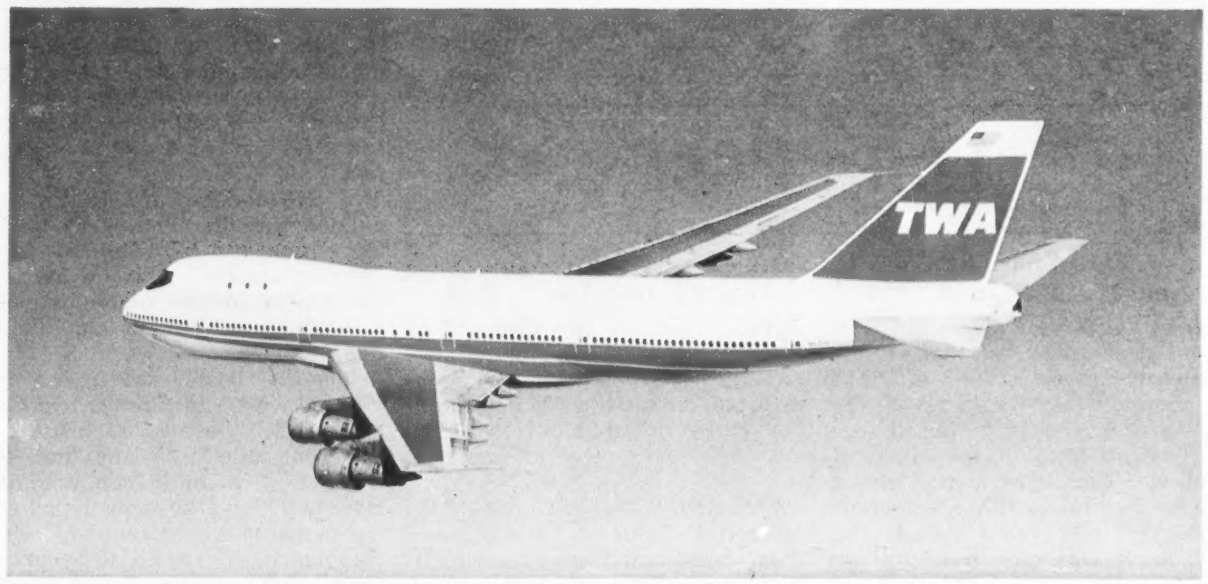
TWA Computes $24 Million Yearly Fuel Saving

An IBM computer is helping Trans World Airlines conserve more than 70 million gallons of precious fuel a year. At current prices this means a yearly saving of $24 million. Key to achieving this are an online flight planning system and a preferential fueling program.

With online flight planning, information on aircraft performance and routes is stored in the computer. The system analyzes payload, fuel requirements, allowable takeoff weight, flight time, weather and up to five different altitudes. The system then displays fuel consumption, flight time and operating cost for every possible route/altitude combination. The system also determines power settings for climb, cruise and descent.

A dispatcher reviews the alternatives and recommends the optimum least-cost route and altitude to the flight captain. The flight plan can be revised at the last minute should the weather or other conditions change.

"Manually calculating the best flight plan once took hours," says Roger R. Fischer, staff vice president, application development and maintenance for Trans World Airlines. "Our System/370 Model 168, located in Kansas City, Missouri, does it in seconds, with accuracy unobtainable any other way. And we plot over 1,500 flight plans a day for Trans World Airlines' worldwide operations."



An IBM computer, which plots over 1,500 flight plans a day, helps Trans World Airlines conserve more than 70 million gallons of fuel yearly.

Preferential fueling helps TWA allow for wide variations in fuel costs at different points. The program helps TWA find the least-cost location to take on fuel along the route. Even though it takes fuel to carry fuel, the computer will show if it pays to carry enough to avoid refueling at stops where costs are high.

"We've adopted other economy measures, such as flying at higher altitudes, flying slightly slower and taxiing on fewer engines," Fischer points out. "But the computer has been a big factor in our economy drive. With fuel bills running over $380 million a year, both the dollars and the precious fuel saved have been vital to us."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

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Editorial

Too Late Now

Having watched its highly promoted Consumer Communications Reform Act become caught in the gears of congressional machinery, the telephone industry has opened its second front.

This latest offensive comes from an industry task force that diligently formulated four proposals [CW, Dec. 12] that would uproot basic network configurations and undoubtedly raise costs to these users.

It is ironic that consumers were hard-pressed to identify with the noncompetitive concepts of the earlier "Consumer" Act, but are not directly affected by an industry proposal that makes no mention of them.

By recommending an industry structure that would eliminate private line service competition, that would do away with foreign exchange (FX) lines and that would eliminate Common Control Switching Arrangements (CCSA), AT&T and its allies have hit the user right in his wallet.

As one source stated, the data user has benefited directly from the churning caused by competitive services and equipment. The industry task force would cut off any real competition for all but point-to-point and tandem tie line facilities.

According to one interpretation, the latest framework would require any competitors that could manage to carve out a permissable niche to price their services under fully allocated (high) costs. At the same time, the existing phone companies would provide similar service under incremental (low) cost principals. The net effect would be the death of the competing carriers.

The proposal would also do away with the value-added carrriers, such as Telenet, which provide network services specifically for data users. Although members of the task force have said they do not intend to wipe out the value-added carriers, no amendment to the original four-point proposal has been made.

In fact, it appears the announcement of the task force proposal was carefully controlled so that pro-carrier segments of the trade press would first have their chance to present it in the most favorable light.

Despite the repeated assurances from AT&T Chairman John deButts that AT&T and its partners really want to get along with the competing carriers, there is little compromise in the latest proposal.

Perhaps AT&T should have looked at the record before it convened a puppet task force to turn back the clock. FX, CCSA and private line services were the brainchild of the existing carriers. But now that revenue is being impacted by the specialized carriers, it apparently feels it is time to shut off these services for everyone — including the user.

The Federal Communications Commission has rejected all the anticompetitive arguments; the courts all the way up to the Supreme Court have turned a deaf ear. There is little question that users will raise an outcry against the anticompetitive attempts.

The truth is that the telephone company is not willing to share the user's dollars with anyone.

It is time the telephone company paid a little more attention to providing better services to users and forgot this continuing futile attempt. Nobody is listening anymore; it is too late.

'Sorry We Can't Negotiate a Settlement of the Antitrust Suit — All Our People Are Tied Up Prosecuting It.'

Data Past

Five Years Ago
Dec. 27, 1972-Jan. 3, 1973

NEW YORK — An internal IBM memo was uncovered that said an "intensive investigation" of IBM's pricing policies "would reveal the extent of price control and its supporting practices" in the computer market. "Such a revelation would not be helpful to IBM's monopoly defense," the memo stated. The document was one of 27 million filed in the various antitrust cases against the company.

— — —

BOSTON — The Massachusetts Privacy and Security Council was formed to oversee privacy considerations in police information systems. The council, made up of lawyers and "interested citizens" rather than users of computer-based criminal justice systems, was to consider whether the state's police agencies should tie into the FBI's Computerized Criminal History system.

Eight Years Ago
Dec. 31, 1969-Jan. 7, 1970

NEW YORK — The shakeout of the time-sharing business continued as ITT Data Services closed its computer facilities in Princeton, N.J., and at Broad St. in New York.

— — —

WASHINGTON, D.C. — Rep. Jackson E. Betts of Ohio warned that "individual dossiers on 33 million Americans would be prepared and housed in federal computers" if two proposed data banks were approved by Congress. The data banks were to be "integral but little-noticed parts of the Family Assistance Act of 1969 and the Manpower Training Act of 1969, in formative stages of consideration by House and Senate committees," according to Betts, who charged "there is no provision in either bill to protect the privacy of citizens whose personal histories will be in the dossier centers."

Letters to the Editor

Multiple Encryption

Even if Martin Hellman's contentions concerning the Data Encryption Standard (DES) are correct and the National Bureau of Standards' contentions concerning the impossibility of building Hellman's brute force code-breaking machine are incorrect ["Federal Encryption System Hit as Vulnerable," CW, Dec. 5], the very existence of an inexpensive device with the capability of the DES part would appear to me to offer a simple method of generating unbreakable code. At the prices quoted in the article, anyone who can afford encryption equipment can afford to use multiple encryption.

My Hewlett-Packard HP-21 calculator supports Hellman's statement that his hypothetical deciphering machine could try each of the 2^{56} possible key combinations in just under 21 hours of continuous operation.

However, if the data to be encrypted were run through two successive DES devices, each using a different code key string, then the number of possible combinations rises to 2^{112}, and the same hypothetical machine would require a continuous run of 1.645×10^{14} years to try all of the possible code key lists.

By carrying this idea through four more steps, (or running the data through six successive DES devices), the number of possible key combinations grows to something in excess of the range of my calculator — i.e., more than 9.99×10^{99} possible codes.

In addition, this method would probably negate the effects of any "rigging" of the basic algorithm by the National Security Agency.

I read *The Code Breakers* several years ago and no longer have a copy, but I seem to remember that the only system rated as completely secure by the experts is multiple machine encryption with frequent (daily, for example) code key changes. The availability of an inexpensive DES-based part would seem to make this an easily achievable goal.

C.J. Morrell
Steilacoom, Wash.

Educators, Not Hucksters

I have difficulty accepting the guilt by association proffered by Mort Burdman ["End the Effluvium," CW, Nov. 14] and other CW letter writers.

Certainly there are those in this field who aim to profit financially by beating the drum of licensing/-certification, etc., but I take exception to the view that those of us who run courses for candidates for the Certificate in Data Processing (CDP) are "hucksters."

I am coordinating an effort by the Philadelphia Chapter of the Data Processing Management Association (DPMA) to sponsor a refresher course for candidates for the CDP. I expect to teach for no more than one-sixth of the 36-hour course and will receive no more than the standard classroom-hour rate we pay all our instructors. If there is a profit in this course, it will revert to the chapter, not to me, to be used for professional programs.

I wish to disassociate our course from those who would drum up controversy for their own personal financial profit (Ken Lord runs a company that provides practice exams, etc.) but I also wish it not to be attacked by those who care to remain ignorant.

William R. Patterson
DPMA
Philadelphia, Pa.

Visit to ProgaMan

How Well Will Robot Programmers Do?

By Jack Stone
Special to CW

Unimate, Versatran, Milicron, Prab ... these are the newest trade names to be added to the ever-growing roster of computer-based products. If they seem unfamiliar to you, it's because they refer to a class of very special-purpose machines called "industrial robots."

Jerry Knight of the *Washington Post* recently wrote an interesting article about these devices. In answer to the question "What is a robot?", he quoted Joseph Engelberger, first president of the Robot Institute of America, as saying, "I don't know how to define a robot but I know one when I see one."

He further noted AMF, Inc.'s claim that its "Versatran Series F — the world's strongest robot — could easily pass for an oversized, deformed drill press, dragging its hydraulic heart and an electronic brain behind it." He went on to say that a Unimation spokesman defined robots as "self-contained, computer-directed machines with memories capable of performing human functions."

To program the machine, "a skilled operator directs it through the desired task, manually moving the robot's arm and hand through the motion while feedback devices record every motion in the robot's computer brain. Flip a switch from 'teach' to 'run' and the robot repeats precisely the movement it has been shown...."

... My friend Lamia Shaitan phoned me late one evening last week. She is a programmer/analyst and amateur inventor. I place here in the "amateur" category because she has yet to succeed in bringing a product to market.

"Hey, man!" she ranted. "Hurry on down here. I've got it! I've finally hit it! I have developed THE answer to the programmer productivity problem.

"None of that targeted 10% improvement stuff from structured this-and-that. I've got the real McCoy — total performance at all times! And no worries for the DP manager about bruised egos, weird working hours and acid rock Musak. It's all resolved!"

I sensed a potential follow-up for my column dealing with automation in the computer center [CW, Oct. 31] but was taken aback by lurid streaks of lightning running through overcast skies as I drove to her Georgetown mansion. I also noticed what seemed to be a tall, outside antenna though I had no memory of Lammy being a ham radio freak.

She ushered me into the garret. "Voila!" she preened, pointing to a metal table on which there was an object about eight feet long and two feet wide. "Let me demonstrate PrograMan!"

I was startled as she opened the skylight, pushed me against a wall and threw a knife switch. A flash of light swept across the room, accompanied by a sharp boom. She twisted the knob on a small black box, waited for a green light to show, then twisted the knob again.

The Human Connection

I noted that the knob was set to "RUN: Cobol Coder; Start 9 a.m."

The cloth rippled. Two claw-like hands came out from under the covering and began to fold it back. What appeared to be some kind of synthetic human (bearing a faint resemblance to some people I've met) sat up, made a yawning movement and then scratched its backside.

The head was squarish and was wearing a dark brown hairpiece and a long, scraggly beard. It was dressed in a drooping tan sweater, faded baggy blue jeans and wornout sneakers. There was a jagged scar on its forehead and two shiny steel knobs protruded from either side of the neck.

PMan appeared awkward as it struggled to its feet and rambled over to a desk. It opened a Cobol reference manual, pulled out flowchart and coding pads, sharpened a pencil, posted a sign saying "out for coffee — back in 5 min." and sauntered into the kitchen.

It returned about a half hour later, picked up the telephone, dialed a number and yelled, "Wake up, you guys down there! Where the blazes is my output? Don't you ever do anything right?"

Then PMan picked up a notebook titled "Systems Feasibility Study" and began to read it. I'm certain I heard it mutter, "I can't believe it! Another crazy user! This one wants the company's New Year's party fund accounting on-line!"

It then looked at its wrist as if checking the time and remarked, "Geez! 11 o'clock already. Better leave for lunch now to get ahead of the crowd. Maybe I'll do some New Year's shopping afterwards." It then started for the door.

Lammy quickly turned the switch to "SKIP 5 HOURS, THEN RUN." PrograMan turned around, set down some make-believe packages, stepped over to the desk, grabbed a pencil, coded 11 MOVE statements during the next minute, and exclaimed, "Yessirree! Ten lines a day keeps the big boss away!"

HAPPY NEW YEAR!!

Unsubstantiated Output

Saks Billing System May Violate ICCP Code

A reader, Gerald Clarke, recently forwarded to me a balance statement he received from Saks Fifth Avenue. It contains an error that leads me to question the validity of the systems design of Saks' billing procedure.

The Taylor Report
By Alan Taylor CDP

Saks Fifth Avenue has a group of computer-flagged accounts called H3s. These are accounts that do not have the true account balance within the computer system at all. They arise particularly when merchandise is returned and credited, but the account then remains inactive. Under these circumstances, the credit is placed in some archives outside the system, and the computer flag, together with the minimum of information about the account holder, are all that is maintained within the system.

These accounts undergo no further activity (except for name and address changes) until some transactions reactivates them. Then out comes a bill like the one illustrated. This shows the new activity, prepares a balance line and prints everything. However, mailing is not automatic; the H3 stops it and instead the bill is sent to research. In the case of Gerald Clarke, it was subsequently mailed to him, unaltered.

Sending the item to research, however, does not stop further processing. Statements come out, claiming that the person concerned owes all the current transactions but failing to give him credit for the true balance of his account still in the archives.

All of this brings us firmly up against the Institute for the Certification of Computer Professionals' (ICCP) Code of Conduct for holders of the Certificate in Data Processing (CDP). Saks insisted to me that what happened to Clarke does not indicate that there is anything wrong with its computer system design, but I think it does.

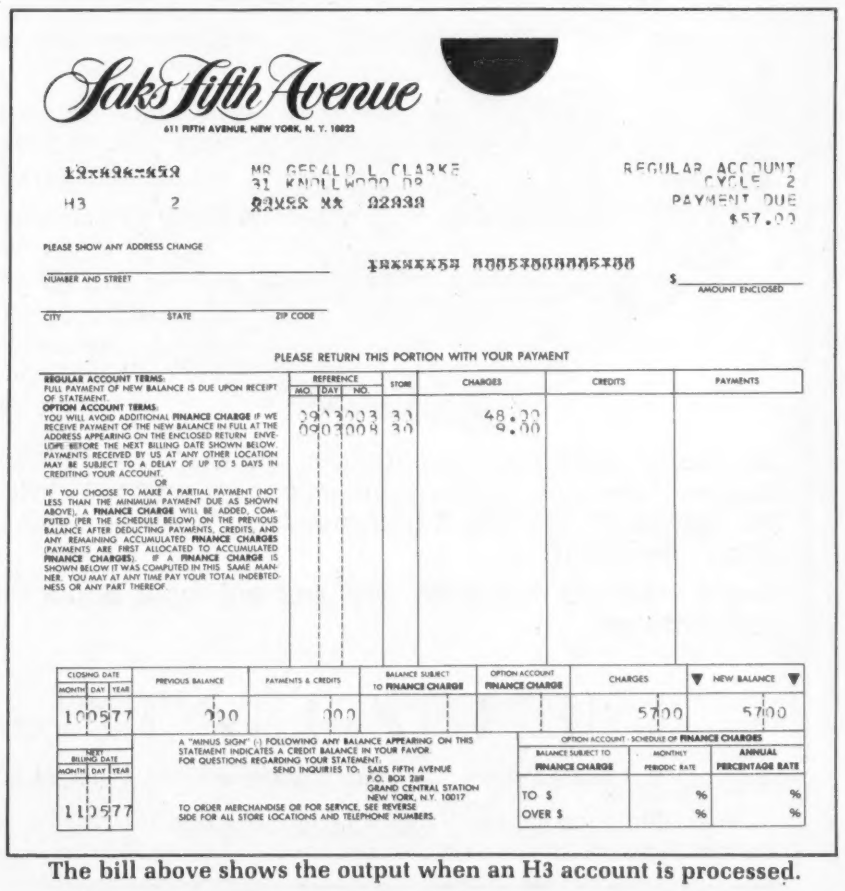
ICCP Code

The ICCP code, which applies to people who have been certified for systems design as well as for other specific subjects, requires that a CDP holder give a "conclusion on a subject in his field only when it can be demonstrated that it has been founded on adequate knowledge." Now, I know of no more formal statement of a "conclusion" than the systems design itself. Therefore, I regard *any* entry on the printed output that cannot "be demonstrated [to have] been founded on adequate knowledge" as a direct infringement of ICCP 2.2.

Now, looking again at the bill Saks put out, the key entry that no one even claims is "founded on adequate knowledge" is the fictitious entry "Previous Balance ..$0.00."

The H3 system flag — printed above top left — indicates that the "previous balance" was some undesignated amount owed to Clarke.

(Continued on Page 16)



Saks Fifth Avenue
611 FIFTH AVENUE, NEW YORK, N. Y. 10022

MR GERALD L CLARKE
31 KNOLLWOOD DR
[illegible] 02838

REGULAR ACCOUNT
CYCLE 2
PAYMENT DUE
$57.00

H3 2

PLEASE SHOW ANY ADDRESS CHANGE
NUMBER AND STREET
CITY STATE ZIP CODE
AMOUNT ENCLOSED

PLEASE RETURN THIS PORTION WITH YOUR PAYMENT

REGULAR ACCOUNT TERMS:
FULL PAYMENT OF NEW BALANCE IS DUE UPON RECEIPT OF STATEMENT.
OPTION ACCOUNT TERMS:
YOU WILL AVOID ADDITIONAL FINANCE CHARGE IF WE RECEIVE PAYMENT OF THE NEW BALANCE IN FULL AT THE ADDRESS APPEARING ON THE ENCLOSED RETURN ENVELOPE BEFORE THE NEXT BILLING DATE SHOWN BELOW. PAYMENTS RECEIVED BY US AT ANY OTHER LOCATION MAY BE SUBJECT TO A DELAY OF UP TO 3 DAYS IN CREDITING YOUR ACCOUNT.
OR
IF YOU CHOOSE TO MAKE A PARTIAL PAYMENT (NOT LESS THAN THE MINIMUM PAYMENT DUE AS SHOWN ABOVE), A FINANCE CHARGE WILL BE ADDED, COMPUTED (PER THE SCHEDULE BELOW) ON THE PREVIOUS BALANCE AFTER DEDUCTING PAYMENTS, CREDITS, AND ANY REMAINING ACCUMULATED FINANCE CHARGES (PAYMENTS ARE FIRST ALLOCATED TO ACCUMULATED FINANCE CHARGES). IF A FINANCE CHARGE IS SHOWN BELOW IT WAS COMPUTED IN THIS SAME MANNER. YOU MAY AT ANY TIME PAY YOUR TOTAL INDEBTEDNESS OR ANY PART THEREOF.

REFERENCE MO.	DAY	NO.	STORE	CHARGES	CREDITS	PAYMENTS
09	13	0003	31	48.00		
09	03	0008	30	9.00		

CLOSING DATE MONTH	DAY	YEAR	PREVIOUS BALANCE	PAYMENTS & CREDITS	BALANCE SUBJECT TO FINANCE CHARGE	OPTION ACCOUNT FINANCE CHARGE	CHARGES	NEW BALANCE
10	05	77	.00	.00			57.00	57.00

NEXT BILLING DATE MONTH 11 DAY 05 YEAR 77

A "MINUS SIGN" (-) FOLLOWING ANY BALANCE APPEARING ON THIS STATEMENT INDICATES A CREDIT BALANCE IN YOUR FAVOR.
FOR QUESTIONS REGARDING YOUR STATEMENT,
SEND INQUIRIES TO: SAKS FIFTH AVENUE
P.O. BOX 2189
GRAND CENTRAL STATION
NEW YORK, N.Y. 10017

TO ORDER MERCHANDISE OR FOR SERVICE, SEE REVERSE SIDE FOR ALL STORE LOCATIONS AND TELEPHONE NUMBERS.

OPTION ACCOUNT - SCHEDULE OF FINANCE CHARGES

BALANCE SUBJECT TO FINANCE CHARGE	MONTHLY PERIODIC RATE	ANNUAL PERCENTAGE RATE
TO $	%	%
OVER $	%	%

The bill above shows the output when an H3 account is processed.

Saks Procedure OK?

1. The Saks System creates a fictitious "prior balance." Is it correct to do this

(a) At all? ☐ Yes ☐ No

(b) For internal purposes to help research? ☐ Yes ☐ No

(c) For outside distribution? ☐ Yes ☐ No

(d) For carrying forward to the next statement? ☐ Yes ☐ No

Comments _____

_____

2. Taylor equates a system's authorized output with the system designer's formal conclusions and says they are, therefore, subject to professional codes.

Do you agree? ☐ Yes ☐ Only Partly ☐ No

Comments _____

_____

3. Does your professional society, or professional certification, have any codes equivalent to ICCP 2.2?

☐ Yes ☐ No ☐ Don't Know

Organizations concerned _____

Name _____

Professional Position _____

Street Address _____

Town/State/Zip _____

Please return the completed form to Alan Taylor, c/o Computerworld, 797 Washington St., Newton, Mass. 02160. Thank you.

System Violates Code of Conduct

(Continued from Page 15)

So, the $0.00 entry, created probably by an initialization routine, not only fails the test of "being able to be demonstrated [to] have been founded on adequate knowledge" but is also directly contra-indicated by the information in the record.

The correct entry in such a case would have been "unknown." This should have been printed in both the "Previous Balance" and "New Balance" fields at the bottom of the invoice and also in the top right-hand entry under "Regular Account Cycle 2." Certainly there is no adequate knowledge that a $57.00 payment is 'Due' — because that springs from the grossly wrong assertion the prior balance was zero.

Now I don't know if the systems design was ever signed off by a CDP, in the way that a set of architectural blueprints are signed off by a certified architect. I don't even know if it was signed off by a member of any of the other professional societies who have adopted similar codes of conduct. I don't know if it was signed off at all or whether Saks should be questioned about why it was running a system without professional sign-off, if in fact it was.

All these things are important in themselves but at the moment I simply want to stress that Saks created computer output both on a bill and on a statement where there simply was no "adequate knowledge" that could support it. I think it's wrong, Saks thinks it's OK; now it's your turn to speak. I look forward to your responses by letter or by answering the questionnaire

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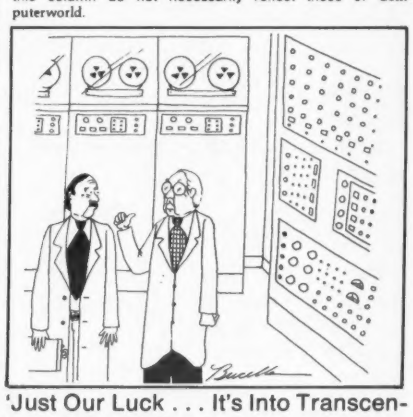

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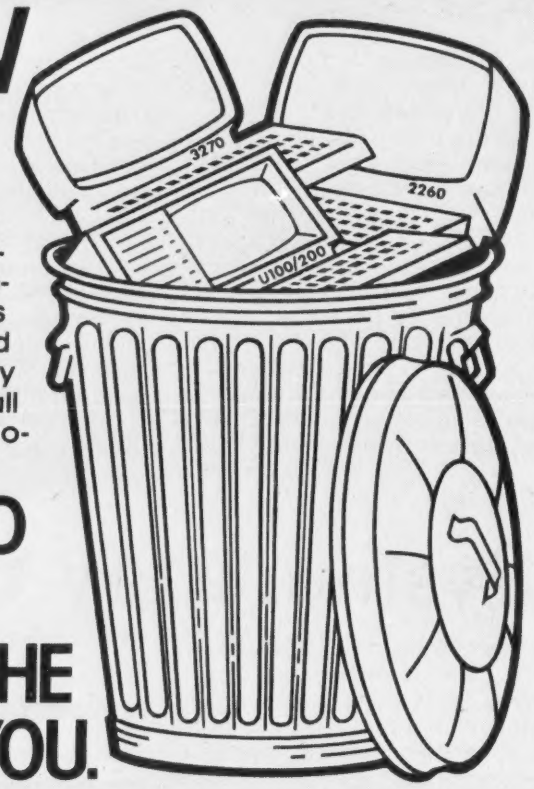

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In Software/Services World

Past Year Interesting But Not Dramatic

By Don Leavitt
CW Staff

Sometimes specific events give shape to a year; sometimes they don't. In the world of software and services, 1977 seems to have been one of the shapeless years.

That sounds far more negative than it should. The year was an interesting one, even if it didn't see any truly dramatic product announcements or widespread battles of users vs. vendors.

The "maturing of the marketplace" often seems like an overused phrase, but it was appropriate for the 1977 software/-services scene.

That showed up early in the year in connection with *Computerworld's* special report on application packages. In past years CW received numerous articles describing, quite usefully, the detailed scoring system a user employed to evaluate various packages.

In '77, however, the stories focused on concerns (sometimes problems, but often just "the best way to...") that came into play after the package was selected.

User Selectivity

Other sources indicated a similar situation. Packages were apparently accepted as a logical way to get work up and running, but as a May headline on an Auerbach survey put it, "Users Happy, Not Ecstatic With Packages." But they were using them.

And much the same sort of thing happened in connection with CW's October report on data base systems. Instead of a few pioneer-like stories, CW received so many manuscripts from "real live" users — and from those who finally rejected "data base" for their installations after studying the other options — that CW still hasn't run all of them.

The users' selectivity was reflected as well in the 1977 Datapro Software Honor Roll. Out of the hundreds of packages on the market, only 32 met the strict but not overwhelming thresholds set by the researchers to earn a place on the honor roll.

Vendors showed equal restraint. Over the past year, the news releases CW received described enhancements or extensions to established packages.

In some cases, the package built for a large CPU was adapted to a smaller one. The financial application packages from Software International, for example, were converted to run on small Burroughs systems.

And the Fortran subroutine library from International Scientific and Mathematical Libraries now includes a subset for Data General users.

IBM itself began to recognize its small systems needed more software than it provided at first. In January, the company offered Fortran for the System 3;, by March and April, both IBM and independent software firms were offering goodies for the Series/1.

Micros to Arrays

Microcomputer software showed up consistently during the year, most dramatically, perhaps, when the UK's CAP Microsoft introduced Microcobol in late February. National Semiconductor announced Nibl for its micros and Altair began offering business application packages for its unit in March.

At the other end of the scale, a package was introduced to help users of the Cray-1 and other array processors "vectorize" their Fortran problems.

That seems to complete the spectrum in terms of machine sizes. The planning currently under way for a "First World Computing Services Industry Conference," scheduled for Barcelona, Spain, next June and including both software and service company representatives, indicates the geographic scope of the user and the vendor ties that became evident in 1977.

'Pride-Logik' Adapted to General Use

CINCINNATI — Pride-Logik, a data and system dictionary package developed by M. Bryce & Associates, Inc. (MBA) for use with its Pride system design methodology, has been adapted by the vendor for more generalized use, a spokesman said.

The package enables a user working with any of several CPUs to show the logic behind "virtually all" of an organization's systems and data flows, taking into account people, places, documentation, files, records, systems and procedures, he said.

Pride-Logik provides cross-referencing, search techniques, design integrity analysis and redundancy checking. Display commands range from single component requests to requests for the entire set of stored components related to a given design effort, he claimed.

For forms and report control, Pride-Logik stores data used in both manual and automated systems. Its ability to trace data and logic flows and to identify all control reports designed into a system make the package useful to internal and external auditors, MBA added.

Pride-Logik is said to be able to run on any CPU with an ANS Cobol compiler and direct access storage facility. Versions are currently operational on Honeywell, Burroughs and IBM mainframes, requiring 40K words, 70K words and 128K bytes respectively.

The package costs $20,000, which includes manuals, forms training and consulting in addition to the software. MBA is at 1248 Springfield Pike, Cincinnati, Ohio 45215.

SAS Users Set Meeting

LAS VEGAS — Leaders in the computer performance measurement and evaluation field will be among those presenting invited papers to the SAS Users Group meeting at Caesar's Palace here late next month.

SAS is a general-purpose data management, analysis and report writing system that is heavily used for reduction and analysis of computer performance data. Performance analyst Barry Merrill of Suntech, Inc. will detail the steps involved in using SAS to tune an IBM MVS environment.

Kenneth W. Kolence of the Institute of Software Engineering will discuss the use of software physics in sizing workloads with SAS, while Mario Morino of Morino Associates, Inc. has chosen the topic "SAS: The Necessary Utility for Computer Performance and Control."

The conference, which will be held Jan. 30-Feb. 1, is sponsored by the SAS Users Group International.

The registration fee is $40 per person ($45 after Dec. 31); attendance is not limited to installations currently using SAS. The group can be reached at P.O. Box 10066, Raleigh, N.C. 27605.

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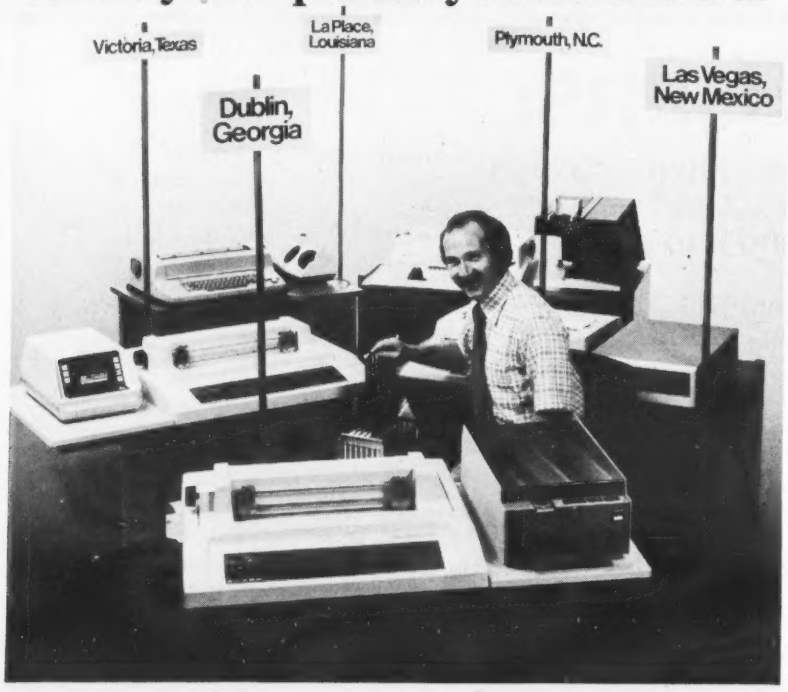

Mexican Baker Whips Up Total MIS by Mixing Mini, Young Programming Team

MONTERREY, Mexico — Few companies are as aggressive in switching from an archaic manual recordkeeping method to a computerized management information system (MIS) as Galletera Mexicana S.A. (Gamesa), the largest producer of cookies and crackers in Latin America with annual sales of more than $70 million. And fewer companies still have achieved such spectacular results in so short a time.

Last year, Gamesa's young management team began to implement an ambitious plan to apply computers to its operation, which, until then, had been run on often outdated and incomplete information. To set the plan into motion, Gamesa assembled a team of 20 systems analysts, programmers and computer operators — mostly young graduates of Monterrey's own Institute of Technology — and bought a Hewlett-Packard Co. 3000CX, the first to be installed in Mexico.

"Less than a year later, the team had completed enough programs to justify the exchange of the 128K-byte HP 3000CX for a new, more powerful 512K HP 3000 Series II," according to Gerardo C. Tamez, Gamesa's director of data systems, who at 28 is the oldest on the team. The computer was installed in September.

Initiation Rite

The initiation of the programmers came in the form of transferring payroll computation from a small, dedicated minicomputer to the larger HP 3000. "Payroll is a large task, considering there are 2,700 employees of which 2,000 are laborers who are paid daily," Tamez said. "To compound it all, there are graduated pay scales for about 500 different positions."

With payroll data and information on available workers collected from supervisors, the first step toward production planning could be taken — the compilation of daily work schedules assigning the right worker to the right job.

"Order backlog and management of inventories of packing materials and staples such as flour, sugar, oil and chocolate are handled by the computer now," Tamez said. "We have yet to include in our data base the status of the machines and ovens and what types of products can be made on them."

Since these important phases of production planning have not yet been completed, Gamesa has had, at times, to endure the annoyances of rescheduling its workers, which means shifting higher paid workers to lower paying tasks.

With more than 450 metric tons of baked goods emerging each day from 17 ovens the length of football fields, the completion of production planning gets first priority at Gamesa.

Centralized Planning

The implementation of the new system required a lot of reeducation, particularly of supervisors who were accustomed to manual recordkeeping. At present, production supervisors call in information to a central planning department where the data is entered via CRT terminals.

Later, they will be asked to mark cards to be read by an optical reader until eventually there will be CRT terminals at all data entry points.

Perhaps the programming team's greatest success so far has been in the area of distribution. From order processing, inventory control, truck scheduling, loading and shipping to invoicing, all are now working on-line. One result: faster turnaround of orders and improved customer service, Tamez said.

"We are also more than one-third along toward giving management a full financial report," he added. Sales forecasts, sales statistics, accounts receivable, sales commission records and expenses and costs are now available on the 3000.

Last month, tax files were added; they will soon be followed by accounts payable. By next year, Gamesa's management will be able to make decisions based on up-to-date production and financial reports called up via CRT terminals.

The effort of centralizing information parallels decentralizing of operations. At present, information from Gamesa's two outlying plants in Obregon and Mexico City and its 15 distribution centers is gathered manually and mailed to the headquarters in Monterrey once a month to be processed.

However, plans call for HP 2640 CRT terminals to be installed by the end of this year to enable daily transfer of pertinent data via modems and telephone lines to and from the HP 3000 data base. By the end of 1977, five more distribution warehouses are projected.

In its present configuration, the computer system consists of the 512K HP 3000 Series II, one 15M-byte disk, two 50M-byte disks, a 200- and a 1,250 line/min printer, three 120 char./sec teleprinters, a 600 card/min card reader, one 800- and one 1,600 bit/in. tape unit and 14 HP 2640 CRTs.

Process Control Next

What's ahead? Tamez and his department are already looking beyond their present goal of a total MIS to another major area: the use of minicomputers in process control.

"Speed of the belt, which controls baking time, and temperature within differently heated sections of the 100-meter long ovens are controlled manually," Tamez said. "Feedback for continuous belt control now comes via telephones from the end of the ovens. A controller will be much faster and more sensitive in making adjustments."

A recent 700% jump in the price of natural gas for industrial users has given new urgency to the project. When implemented early next year, minicomputer-controlled ovens are expected to save fuel by burning more efficiently.

Interconnection of the controllers with the HP 3000 will enable gas volume data to be included in up-to-date production cost computations and will yield extensive data on oven temperatures for studies.

Neat/3-Cobol Conversions Offered in North America

SAGINAW, Mich. — Four agents have been named by Computer Software Facilities Ltd. to market the Neat/3 to Cobol (Necol) package [CW, July 11] in the U.S. and Canada.

One of the distributors, Curry Computer Center here, is now offering the package on a service basis, keyed to number of lines to be converted from NCR's unique Neat/3 to ANS Cobol 74. The other agents have not yet announced their plans for Necol.

Curry will accept users' Neat/3 programs and do the conversion on the NCR Century 200 at the center, or it will ship a disk-based copy of the program to the user's site.

When it is shipped, the software is modified to be inoperative after it has converted a predetermined number of lines of code, a spokesman noted.

The technique Curry uses to "turn off" Necol is tolerant, however. The conversion of a program will continue until it is finished, even if the line limit is passed during the operation. But Necol will not accept any more work after that, the spokesman said.

Curry charges 10 cent/line for the Necol work with a minimum charge of $4,000, whether the work is done at the center or at the user site. Special help for instructions that can't be converted by Necol is available at extra cost, a spokesman said from 4600 Seidel here in Saginaw, Mich. 48602.

Canadian users can contact Curry through P.O. Box 2177, Niagara Falls, Ont. L2E 6Z3.

The other distributors include, for the northeastern states, James D. Hallman, P.O. Box 304, 335 E. Orange St., Lancaster, Pa; for the Southeast, Interactive Business Systems, P.O. Box 7207, 11616 Wilmar Blvd., Charlotte, N.C. 28217; and, for the western states, International Computer Technology Corp., 465 California St., San Francisco, Calif. 94104.

Spooler Eases DG Print Work

ATLANTA — The Spooler Utility now available from Technical Analysis Corp. (TAC) was designed to route printer output generated by Data General Corp. Novas and Eclipses to intermediate disk storage.

This not only avoids delays that sometimes occur because of the slowness of the target printer compared with the speed of the CPU, but also eliminates conflicts caused by more than one program needing the printer at the same time, a spokesman said.

It also permits printing to be done apart from the run that created the output, which may relieve pressure on the operators. Since the text of the reports are available on disk until they are overwritten, extra copies of the output poses no problem, he added.

Written in Business Basic, the spooler carries a license fee of $500, which covers the programs on magnetic tape and printed operator instructions.

TAC is at 120 W. Wieuca Road N.E., Atlanta, Ga. 30342.

'Logout' Options Added

FAIRFIELD, N.J. — The Logout package, which reportedly routes DOS/VS console messages to a line printer to speed up most operator functions, has been enhanced with a pair of separately priced options, according to the vendor, Macro 4, Inc.

The Console Reply Queueing (CRQ) feature is said to treat any messages that require an operator response separately from the routine "status report" type of messages. CRQ stores the vital messages in a buffer and enables the operator to check if there are any outstanding.

In addition, the routine also prints a prompting message of its own on the console if any DOS/VS message is left unanswered for more than three minutes, a spokesman said. It provides an audible warning if messages from the DOS/VS Logical Transient area are pending, he added.

Analog, the second enhancement option, supports the creation and analysis of a file of historic log data. With Analog in place, the user can work through this file, applying his own selection criteria of what should be analyzed.

The base price for Logout remains $90/mo, while CRQ and Analog add another $15/mo and $10/mo respectively, he said from Gothic Plaza, 376 Hollywood Ave., Fairfield, N.J. 07006.

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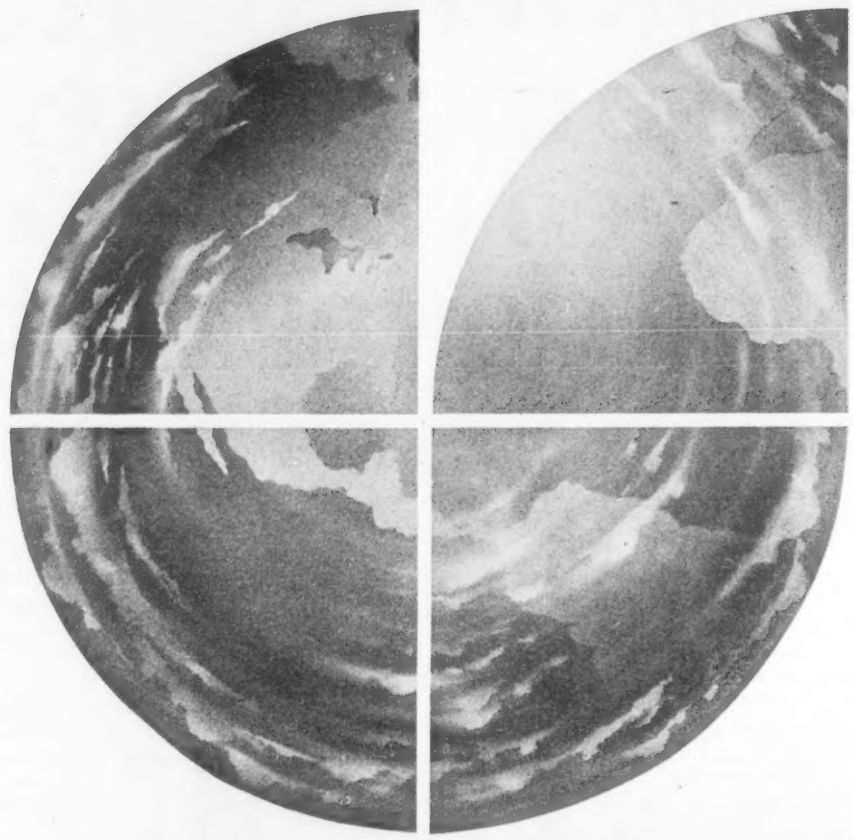

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Disk Space Manager Eases Work at DOS Site

TORONTO — "We now have effective on-line capability for testing, something we could not achieve before. That's an important asset when you consider we have some 700 homegrown programs that are continuously changing and we're developing others to meet the changing needs of the company."

That's Frank Farrell, program supervisor of the DP Department of Guardian Insurance of Canada, describing the results of his company's installation of a disk space allocation package.

The company offers all lines of general insurance throughout Canada; effective and rapid program testing on a configuration consisting of an IBM 370/138 is a response to the ongoing growth in the life and general insurance sectors.

"We face very tight deadlines and the requirement to test rapidly and effectively is always with us," Farrell explained. "What interested us in Easyspace, therefore, was the enhanced flexibility it gave us to move easily in several directions without impeding ongoing operations.

"Today not only can we perform effective on-line testing — something we could not do prior to acquiring the package from Valve Computing, Inc. — but we can test several times a day without disrupting schedules. In short, we have been released from 'conventional constraints.'"

Heavy Tape User

Farrell pointed out that the DP Department is a heavy tape user and testing of the programs requiring tapes had to be run in batch mode. To do the job it is doing now, the department would have had to acquire four additional tape drives.

"We could also see our disk scratch space requirements growing, and Easyspace immediately cut those requirements," he added.

Easyspace is a system enhancement for DOS/VS users that allows runtime allocation of scratch disk work space from a pool of available space and the conversion of files from tape to disk without program changes. It addresses the problem of assigning disk workspace to applications and reportedly eliminates the programming effort required to interchange tape and disk files.

Previously, the DP Department defined the physical disk pack and track extent areas to be used for scratch space; because this resulted in contention between programs for disk space, the system would "prohibit" some jobs from running concurrently.

Since the installation of Easyspace, however, all scratch space is retained in a pool and is assigned as needed on a nonconflicting basis. Scratch disk files are made partition-unique at runtime, Farrell noted.

Clarification

The evaluation of the Cray-1 array processor at Los Alamos Scientific Laboratory (LASL) [CW, Dec. 12] took place from March to October 1976, when the software supplied by Cray Research was as the story showed. Since then, however, an operating system and a compiler have been developed and refined, a Cray spokesman stressed.

A final, detailed report of the LASL Cray study (identified as publication LA-6456-MS) was written by the lab's Tom W. Keller and is available free as long as supplies last from LASL, Los Alamos, N.M. 87545.

The report is also available (for $5) through the National Technical Information Service, P.O. Box 1553, 5285 Port Royal Road, Springfield, Va. 22151.

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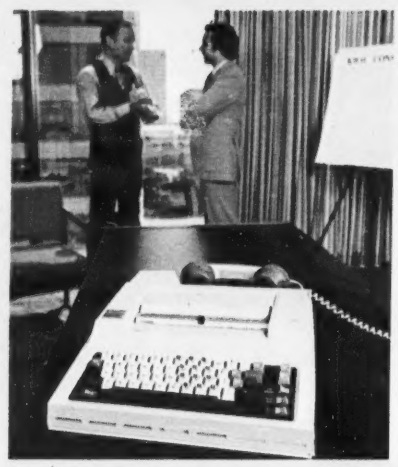

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While Bell Bill Suffered

SNA, Interfaces Stirred Debate in '77

By Ronald A. Frank
CW Staff

Network architectures, interface standards and anticompetition legislative efforts were among the major issues affecting data communications users during 1977.

IBM's Systems Network Architecture (SNA) became a controversial subject when at mid-year, Howard Frank, president of the consulting firm Network Analysis Corp., said the IBM architecture had serious limitations and would require major modifications if it were to overcome its inflexibilities.

Several months later, a *Computerworld* survey showed that out of 20 large communications users, only 20% had made a commitment to SNA and 25% had rejected it. The survey also showed that 40% were uncertain about the impact of SNA.

In November, consultant Dixon Doll said DP vendors had not properly accepted the existence of the public packet networks. Doll cited SNA's limited compatibility with the CCITT X.25 protocol as an example of interfacing that had to be improved.

By the end of the year, most major mainframe/terminal vendors had introduced their own versions of a network architecture. But in many cases these were constructed mainly to encourage use of the vendor's equipment rather than optimize packet network interfacing for the user.

NCR introduced its architecture in August and joined others such as IBM, Univac, Digital Equipment Corp. and Burroughs Corp. in trying to establish an X.25-compatible environment for both present and future network users.

In April, Raytheon Data Systems Co. became one of the first terminal suppliers to provide a direct X.25 interface when it introduced an intelligent CRT that utilized software developed by Cambridge Telecommunications, Inc. Shortly thereafter, Telenet introduced X.25-compatible concentrators for use in its packet net.

Datapac Begins Operations

And in Canada, Datapac finally began operating using its Standard Network Access Protocol (Snap) version of the CCITT X.25 standard. Although at communications conferences there were some impressive intercontinental demonstrations linking various packet nets, packet technology was still far from general use by users.

In the meantime, some users perceived a threat that existing private-line flat-rate facilities might be shifted to measured time services. This concept was first raised by the Italian postal, telephone and telegraph authority at a meeting of the Consultative Committee on International Telephone and Telegraph (CCITT) and other evidence developed during the year.

Although the Consumer Communications Reform Act was regarded as a threat to competition at the beginning of 1977, its impact appeared blunted as the months went by. In February, a joint resolution was introduced in Congress by Rep. Timothy Wirth (D-Col.) and others counteracting the intent of the Bell-sponsored act and reaffirming the concept of Federal Communications Commission (FCC)-approved competition.

In December, a telephone industry task force came up with a new proposal that was regarded as slightly more liberal than the reform act, but specialized carriers and other industry sources said it would still eliminate many of the service choices now available to domestic network users.

Throughout the year, the question of where communications stopped and DP started remained unsolved despite the reopened Computer Inquiry before the FCC. Even the issues of whether the Bell Dataspeed 40/4 was a DP device or not remained open after a U.S. appeals court heard oral arguments on the issue.

In September, CW published specifications of the still-unannounced Bell Data Network (BDN) which, most observers agreed, looked more like a DP service than an offering provided by a common carrier. At year's end, there was still no announcement from Bell about BDN and it was generally accepted that its introduction would depend on how the Computer Inquiry defined the boundary between DP and communications.

During the year, the American National Standards Institute (Ansi) began work on a datagram addition to the X.25 standard and this was meant to provide a second interface alternative to users along with the X.25 virtual circuit approach. Although detailed in nature, it was said that the datagram approach would give users more end-to-end control over their packets on public data networks.

One of the most important instances of user involvement in communications issues occurred when the Tele-Communications Association (TCA) took a united stand in opposition to Bell's Consumer Communications Reform Act. Unlike other user organizations, which kept out of the limelight, the TCA decided that the only way user interests could be protected was for it to speak out. The user group issued several position papers and sent representatives to Washington to testify about user needs.

Despite the promise of improved services and equipment, the year ended with users depending mainly on the same types of networks that had been available for a number of years. Satellite Business Systems (SBS) began to discuss the services it would be providing to users, but this capability was not scheduled to be available before 1981.

Paradyne Modem-Sharing Unit Handles Four Data Terminals

LARGO, Fla. — Paradyne Corp. has introduced the Model 835 modem-sharing device (MSD) which lets up to four stand-alone intelligent terminals or four clustered terminal control units communicate through a single modem.

The modem-sharing device reportedly allows users to lower their line costs through point-to-point communications links between remote locations and a central site. Modem-sharing allows users to save the cost of the multiple lines which would otherwise have to be run, a spokesman said.

The Model 835 MSD is said to reduce the number of stand-alone modems required in data communications networks by up to 75%. The unit acts as a serial distributor that accepts control signals required for data transmission from I/O devices and passes them along to modems, the company said.

Intelligence provided in the modem-sharing device accepts only one request-to-send signal from one modem at any time. The other modems are locked out until the modem at the other end of the line has received an end-of-transmission message.

A rotary switch on the front panel of the modem-sharing device alows operators to manually halt transmission from any of the four modems connected if a modem enters the streaming mode.

Most modem-sharing devices currently on the market either depend on a network control system to handle streaming conditions or else require that the streaming device be physically disconnected, the spokesman said.

Terminals or control units can be linked to the Paradyne modem-sharing device through RS-232 connectors, and the device can be attached to any of the four modems.

The Model 835 MSD costs $550 or rents for $50/mo on a two-year lease. Deliveries are 30 days from Paradyne Corp., 8550 Ulmerton Road, Largo, Fla. 33540.

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At Large-Scale Installations

Multiple Micros Ease Front-End Processing

By John R. Laughlin
Special to CW

Microprocessors continue to revolutionize the computer industry—but primarily the revolutions are in small-scale devices which give credence to the "micro" aspect of "microprocessors."

Although microprocessors are increasingly associated with network switches and data controllers, it is only recently that serious thought has been given to their use in large-scale installations. In order to function in this environment, it was necessary to design multiple-CPU systems that could work in conjunction with other computers to distribute a large-scale processing load.

Design criteria for facilitating a distributed processing system with a minimum of user-disruption include:

• The system must continue to employ the user's mainframe to eliminate program conversion — but must offload the mainframe to reduce cost.

• The front-end communications processor must not only serve as a terminal handler, but also must be able to serve as a sophisticated switch in a network of CPUs as well as an independent minicomputer system.

• The data base management system (DBMS) itself would be executed in firmware (microcode) as an independent processor accessable by all CPUs connected through the front-end processor.

Such a configuration would be more flexible, less costly and far more efficient than conventional solutions to these related problems, since "processing" of a variety of functions would be done by dedicated microprocessors specifically chosen and programmed for that function. The system would consist of three modules, each of which is a multiple-microcomputer system (see diagram on Page 23).

The specific microprocessor-based modules are:

• A powerful minicomputer system which provides terminal handling capability and serves as the data controller to the DBMS processor.

• Multiple medium-speed channel interfaces between the minicomputer and the mainframe computer(s).

• A DBMS processor linked to the minicomputer via a variable speed channel interface.

The minicomputer is composed out of a network of microprocessors and offers a full complement of both system-level and application-level pro-

(Continued on Page 23)

AJ Brings Out Coupler/Modem

SAN JOSE, Calif. — Anderson Jacobson, Inc. (AJ) has unveiled the AJ 1245, a Bell 103 and 202 mode-compatible acoustic coupler and modem in one unit.

The 1245 was designed to handle the transfer of low- and medium-speed data over the normal voice-grade telephone lines using a telephone handset, AJ said.

The AJ 1245 will interface with any EIA terminal and communicate acoustically up to 450 bit/sec in 103 mode and to 1,200 bit/sec in 202 mode. The user can switch-select between these two models with the coupler automatically adjusting speed and interface protocol, according to a spokesman.

In the acoustic mode, the 1245 automatically switches to the manual Data Access Arrangement (DAA) modem when the DAA cable is connected. The AJ 1245 costs $795.

AJ also announced a lower price of $595 for the Adac 1200 acoustic data coupler and a 36-month lease plan at $30/mo.

The Adac 1200 transmits and receives data at 1,200 bit/sec either acoustically or over the dial-up telephone network with a DAA.

AJ is at 521 Charcot Ave., San Jose, Calif. 95131.

Can off-the-rack softwear fit you like a glove?

A special report on *Applications Packages* in the January 30th *Computerworld*.

When the applications program you write yourself costs five times as much as a package you can buy off the shelf, "canned" software has a lot of appeal. Off the shelf software has become more attractive for vendors, too. Many small system manufacturers, for example, have found that applications software sales can add 15% or 25% to their hardware revenues. And more companies than ever before are entering the market with new software products for a wider range of applications — with ever greater modularity.

We'll be taking a close look at the subject in our January 30th special report, titled *Applications Packages*. Edited by Don Leavitt, this report will summarize the latest information available — including products, vendor strategy and market activity. In problem/solution format, the report will feature user experiences in the evaluation, selection, installation and use of applications packages, as well as topics like these.

- Converting programs and files from one hardware or operating system to another — examining the effort required.
- A statistical evaluation of commercial software — survey analysis.
- A review of vendor support for training and installation, and for installed packages affected by government regulations.
- Applications options offered to users through remote computing services.
- An overview of the industry — how vendors are expanding into new applications areas; adapting current lines to different CPU's; or consolidating product line to concentrate in selected areas of expertise.

If you're an MIS executive, DP Manager, Supervisor or Lead Programmer, our January 30th special report should be on your reading list. If you market programming products or services, you should put this report on your ad calendar. Ad closing date is January 13. Your *Computerworld* salesman can give you complete details. Or reserve your ad space today with a call to Terry Williams at (617) 965-5800.

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Multiple-Micro Front End Developed for Large Users

(Continued from Page 22)

grams in addition to its communications processing function.

Among the features of the minicomputer which would be critical to an efficient system are multiple central processing elements, each of which shares all of main memory; multiple microprocessors to serve as I/O channel controllers and terminal handlers; and field-upgradability of all components, including CPUs.

The channel interface between the minicomputer and the installed mainframes must offer throughput of up to 200,000 char./sec. From the mainframe side of the channel-to-channel interface, the minicomputer (and its peripheral devices) must look like a high-performance tape drive to the mainframe computer so programs running on the mainframe can use standard access methods and can thus effect either batch or interactive data transfers.

A variety of interface configurations must be available to increase throughput and maximize configuration flexibility. When traffic between a single mainframe and the minicomputer reaches a high-volume level, additional channel-to-channel interfaces may be connected between the CPUs.

In addition to providing multiple links between the two mainframes, a single minicomputer will serve as the center of a "star" configuration through which multiple CPUs are linked. Not only will the minicomputer thus serve to switch traffic between these CPUs, it will also serve as a central data base accessed by a variety of distributed processors.

Of course, in such a star configuration, each mainframe processor can have more than one channel link to the minicomputer.

Heterogeneous Processors

Each DBMS central processor will consist of up to 16 independent processors. Each of these processors has its own read-only memory and random-access memory and executes an instruction stream completely independent of the other processors.

In addition to the memory directly associated with an individual processor, all processors share a common memory used for passing information between the processors, primarily in the form of buffers.

Unlike other "multiple-CPU" systems, the central processors in the DBMS processor are heterogeneous: each of them has varying characteristics which make them each optimally suited for their specific function. Not only do the performance characteristics of each processor vary, so do their instruction sets.

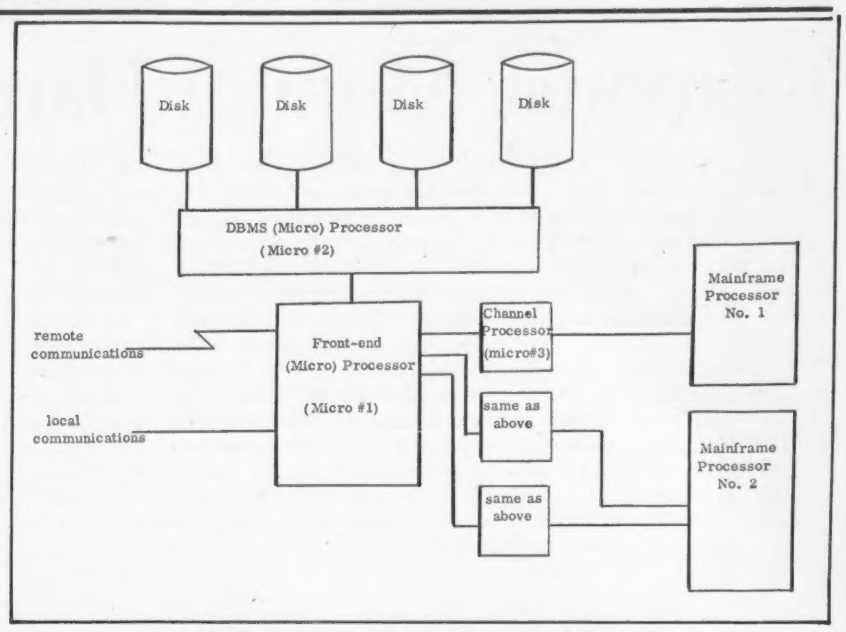
For example, the specific processor which handles the "sort" function in the DBMS processor will be a very different piece of hardware than the processor that would handle the "lookup" function.

Once the individuality of the processors is understood, it becomes apparent why it is difficult to differentiate between "hardware" and "software" in the DBMS processor system. For example, the function known as "sorting" is no longer performed by code executed by the "CPU," but rather is the specific function of a microcoded "processor" which does nothing but perform this function.

Several important concepts should be apparent from the foregoing. Of some importance is the relevance of micros to large mainframe users.

More significant, however, is the change that microcomputers will effect on our thinking about what constitutes a "computer." A "computer" is no longer simply a monolithic device for fast arithmetic; instead, it is a series of unique, related processors, each contributing to the efficient management of the system.

Laughlin is president of Digital Systems Corp. of Walkersville, Md.



Multiple-Microcomputer Front-End System

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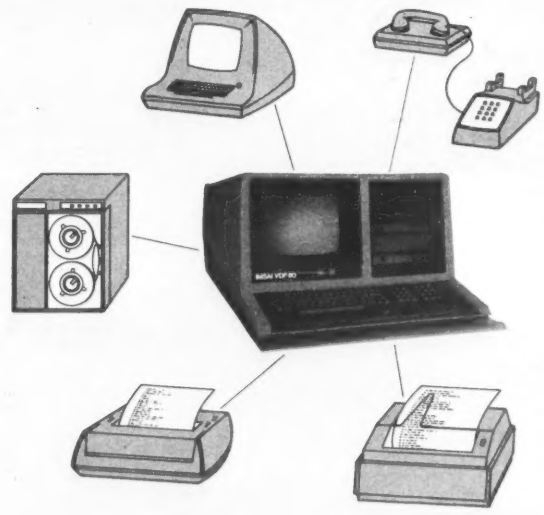

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Response Monitor Handles Multidrop Nets

SALT LAKE CITY, Utah — Questronics, Inc. has introduced a monitor that is reportedly capable of keeping track of response time on asynchronous and bisynchronous multidrop terminal networks.

The Model 300 response time monitor can be connected to a terminal either through an optical coupler, where indicator lights display a transaction in progress, or via an RS-232C bridge connection, the firm said.

The unit maintains a running average of response time, the number of transactions that have occurred, minimum and maximum response time and the last transaction time. These are shown on a four-digit LED display along with the name of the particular category involved, a spokesman noted.

Data rates of 75-, 110-, 300-, 600-, 1,200-, 2,400-, 4,800- and 9,600 bit/sec can be monitored with response time monitoring on either half- or full-duplex circuits, the spokesman said.

In the bisynchronous mode, the control unit and device addresses are switch-selectable into the monitor and response time information is received by observing the data flow on the communications link.

Resolution of the monitor is said to be .1 sec with a maximum display of 9,999 possible.

The monitor and interfacing cables cost $1,500 from Questronics at 3565 South West Temple, Salt Lake City, Utah 84115.

Tiger From Micon Turns TV Into T/S Terminal

OAKLAND, Calif. — A unit that can reportedly transform a standard television set into a time-sharing terminal via the antenna input has been announced by Micon Industries.

The Television Interface General-Purpose Economy Remote (Tiger) terminal contains an acoustic coupler for communications with remote time-sharing computers, a full Ascii keyboard and an RS-232C connector as a computer interface, according to a spokesman.

Up to 1,024 characters can be simultaneously displayed in switch-selectable formats for eight or 16 lines or 32- or 64 char./line, he added.

The Tiger unit sells for $500 from Micon at 252 Oak St., Oakland, Calif. 94607.

Trivex Has CRT 3277-Compatible

COSTA MESA, Calif. — A 480-character CRT said to be plug-compatible with IBM 3271-2 and 3272-2 controllers is available from Trivex, Inc.

The Model 0771 is organized into 12 lines of 40 characters each. It offers a variety of enhancements including local display-to-print, 10-key numeric pad, light pen, optical character recognition wand, operator prompting line, cursor position display, cluster diagnostics and response time indicator, Trivex said.

The response time indicator displays average response time, number of transactions, maximum response time and number of responses above a preset response time threshold. The response time threshold is variable from 0- to 30 sec, the firm said.

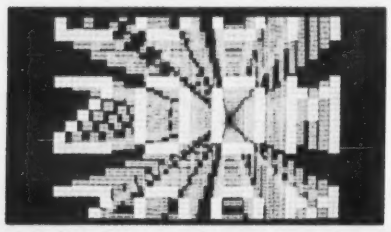
The price of the Model 0771 480 character display is $2,950. The three-year lease rate is $79/mo including maintenance. Trivex is at 3180 Red Hill Ave., Costa Mesa, Calif. 92626.

Most graphics terminals are too dumb for words.

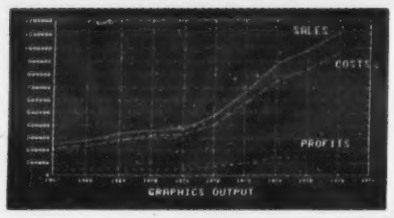
Even expensive models get tongue-tied when it comes to alphanumerics. But now there's a bright new graphics terminal that has a lot to say for itself.

Alpha-graphics: the perfect combination.

It's the Hewlett-Packard 2648A alpha-graphics terminal. For just $5500,* it will dazzle you with a virtuoso display. You'll see zoom and pan, area shading, pattern definition, rubber band line, scientific plotting and graphics text composition. Having independent memories for graphics and alphanumerics, you can do auto-plots with or without words and figures on the screen.



And when you need a smart alphanumeric terminal for on or off-line work, stay right where you are.



How smart is smart?

Ever seen a graphics terminal scroll 200 lines of interactive dialogue? And store up to 220K bytes of data (words and pictures) on twin cartridges? And cut out repetitive routines by storing up to 80 characters on each of eight "soft keys"?

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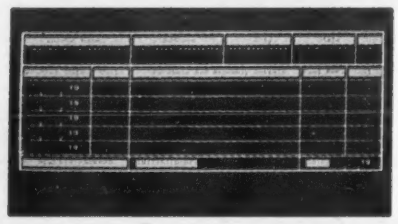

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Like all our terminals, the HP 2648A has a clean, tough, modular design. Open it up like a suitcase, and you'll see the neat row of plug-in PC boards.

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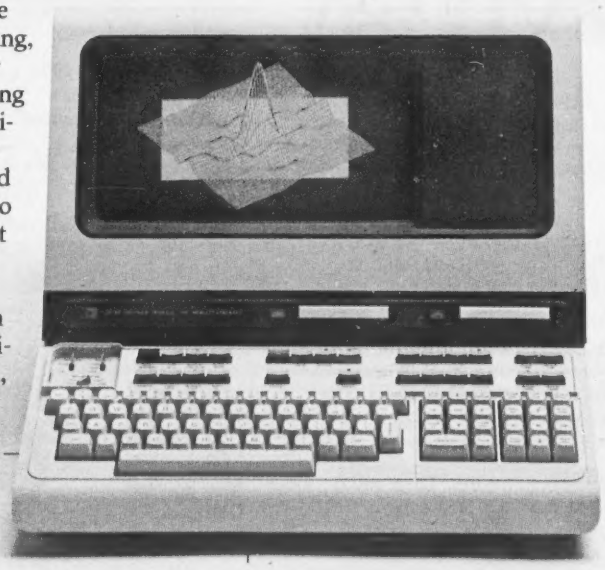

Yes, give me the good words (and pictures) on the HP 2648A terminal.

☐ I'd like a demonstration. ☐ Send me information.

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Peripherals Area Quiet

Processors, Price Moves Led '77 Action

By E. Drake Lundell Jr.
CW Staff

Processors and price were the key words for the mainframe manufacturers during 1977, while the usually turbulent world of peripherals seemed to pause during the year.

Clearly, IBM's announcement of the three members of the 30 Series family topped off the processor news, but most other major mainframers also had spectacular announcements of their own.

And all the while, the plug-compatible CPU manufacturers — Amdahl Corp., Itel Corp. and Control Data Corp. — were getting enough systems out in the field to show that they could be viable forces in the computer marketplace.

This in turn may have forced IBM into the drastic price cutting on its 370 line of equipment, which also marked the past year.

But while all of this was going on in the world of mainframes, there was very little activity in the peripherals marketplace in terms of new products or concepts. Rather, the competitors that have made it through the turbulent shakeups in that field in the past continued to fill orders — probably glad that the furious pace of innovation has slowed somewhat.

On the mainframe front, Honeywell Information Systems, Inc. started the action in January with the introduction of the 66/85 and three mid-range machines in the 64 series.

Then, in February, Burroughs Corp. brought out the 7800 to compete with IBM 370/168 class machines.

While the mainframe area was quiet in March, the action really picked up in April, when IBM took a meat cleaver to the prices of its entire 370 line and introduced the 3033 processor, the first machine in what was to become the 30 Series.

Like the others to come in this series, the 3033 was just a processor announcement, with IBM apparently deciding to keep the 370 family of peripherals in operation for a while longer through processor-only upgrades.

Most of the industry reacted to the IBM price changes with juggling of its own, bringing a whole new — lower — price structure to the computer marketplace.

Also in April, the AS/5 from Itel received its first customer checkout which showed it was competitive with the IBM 158.

In May, NCR Corp. brought out three mid-range machines in the 8000 series and CDC moved into the plug-compatible CPU market with the Omega 480, in two versions, to compete with the IBM 138 and 148.

CDC's entry upped to three the number of firms chipping away at IBM's market by offering users cheaper CPUs that could run IBM software with no changes.

The summer was a quiet time for the mainframers, but October brought announcement after announcement.

IBM began it all with the long-awaited introduction of the 3031 and 3032, which drastically shifted the price/performance ratio in the industry.

Itel quickly reacted with the introduction of the AS/6 to compete against the new price/performance standard, while Amdahl stood pat with its line in processors.

Univac also reacted in October with the largest new product announcement in its history — five mainframes, two in the 90 series and three in the 1100 series. All were pegged to the new IBM price/performance levels.

Burroughs also chose October for the introduction of the B6817, perhaps giving that month the record for mainframe introductions, with nine machines being launched.

In November, HIS finally caught up with the others and announced a restructuring of its 68 line with the introduction of the 68/Distributed Processing System. The firm said the new machines were more powerful than their IBM counterparts, but didn't release any technical information to back up those claims.

And then as the year drew to a close, NCR topped off its 8000 Series with the V8580 to compete in the 370/148 market and the V8590 to go into the market for IBM 3031 class machines. The two are the most powerful NCR processors yet.

Micrographics '78 Slated for Boston

WASHINGTON, D.C. — The National Micrographics Association (NMA) has announced that its 27th Annual Conference and Exposition, "Micrographics '78: Building Information Bridges," will be held in Boston on May 9-12 at the Sheraton-Boston Hotel and the adjacent John B. Hynes Auditorium.

Following the opening of the general session on Tuesday, May 9, afternoon seminars will be devoted to micrographic applications in such emerging markets as banking and finance, engineering systems, health and medicine, insurance and retail/wholesale areas. Preconference seminars on May 8 will offer information on the fundamentals of micrographics for those less familiar with the technology.

The 23 educational sessions tentatively scheduled for Wednesday and Thursday will feature such topics as competing system technologies, equipment analysis and system design.

Wrapping up the conference on Friday will be a discussion on the role of micrographics in the "Office of the Future."

Information on the conference may be obtained from the association at 8728 Colesville Road, Silver Spring, Md. 20910.

EMM Add-On for IBM 370/148 Helps First User Cut Downtime

LOS ANGELES — The first user of Electronic Memories & Magnetics (EMM) add-on memory for an IBM 370/148 mainframe reports having virtually no downtime caused by memory failures.

CMS Industries, Inc., a service bureau that features on-line teleprocessing, found that it outgrew its 370/145 and decided to go to a 370/148. At the same time, the company made the decision to include independent add-on memory in the replacement system, a spokesman explained. The firm needed additional memory capacity and felt that installing independent add-on was the least expensive way to get it.

"Our increased growth rate required a more powerful machine than the 370/145 we've had for the past several years. We decided to go with the 370/148 because the cost/performance ratios met our criteria," according to Tosh Nakahiro, president. We hurriedly put in an order to EMM for add-on memory. We knew that it had just announced the product, but we wanted to be the first in line. We agreed to be the engineering test site because of [EMM's] past performance record with CMS."

CMS installed the 370/148 with 2M bytes of IBM memory and an additional 1M byte of EMM memory.

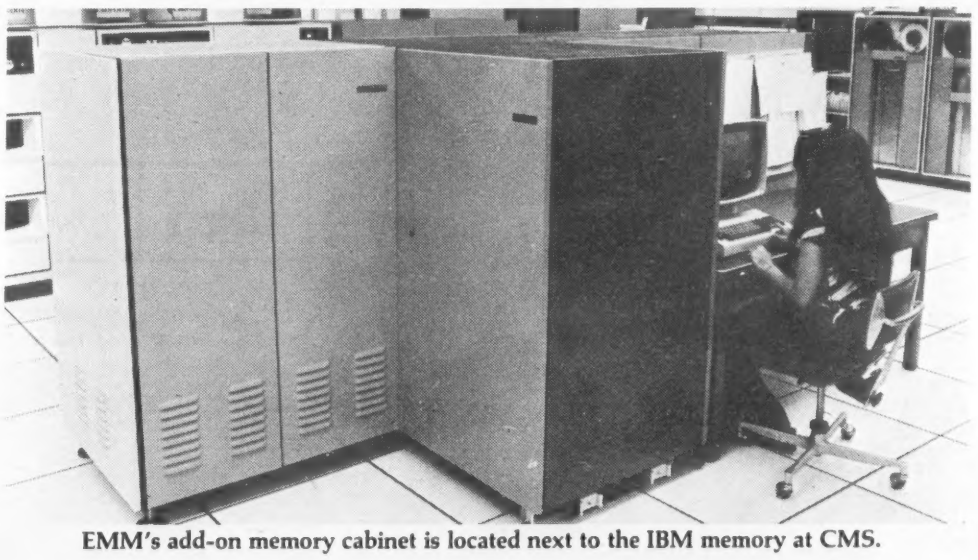
The CMS DP operation utilizes 3350 disk drives and 1403 printers. More than 100 terminal locations are spread throughout the U.S. and Canada. The terminals, manufactured by IBM, Sycor, Inc., Olivetti Corp. and Four-Phase Systems, Inc., communicate over a telephone network.

Two Major Benefits

One of the main considerations in selecting and staying with EMM memory was that it is compatible with the IBM system, Nakahiro noted. "We are getting two major benefits with [the] memory. First, we can give our users improved terminal response time and we can evaluate Multiple Virtual Storage (MVS) on the 148," he said, adding that running MVS efficiently on the 148 will be beneficial to both CMS and its customers in the long run.

CMS is an on-line operation and, therefore, installation time was an important factor. EMM installed the 1M byte in 12 hours. "We have had an excellent record of support from EMM and always good response time on service," Nakahiro noted.

CMS is now handling more than 4 million transactions per year, and the installation of the 148 and add-on memory will allow the firm to keep up with growth projections. In fact, the firm plans to add another 1M byte of EMM memory, Nakahiro reported.



EMM's add-on memory cabinet is located next to the IBM memory at CMS.

DEC 26 77
UMI

Switches Designed for IBM Users

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) has anounced the availability of IBM plug-compatible peripheral switches and associated energy-saving devices. The products are designed for users of multiple IBM systems.

The peripheral switch, Model 1000, is architecturally and operationally compatible with IBM 360s and 370s, according to a spokesman. The switch is available in matrix sizes from 2 by 4 through 8 by 24 and is designed to allow switching of up to eight channels between 24 controllers.

The Model 1010 energy control subsystem lets users centrally control power on/off functions for all control units, according to the spokesman.

Both models are manufactured by Dataswitch Corp., East Norwalk, Conn.

Prices for the Model 1000 range from $26,000 to $350,000, depending upon switch configuration and the number of energy control subsystems required. Lease terms are also available. Calcomp is providing maintenance, the firm said from 2411 W. La Palma, Anaheim, Calif. 92801.

Bendix Has Digitizer, Mapping System

ANN ARBOR, Mich. — An Interactive Design, Drafting and Mapping System and a microprocessor-controlled digitizer have been announced by the Bendix Corp.'s Aerospace Systems Division.

The Datagrid II mapping system is an expandable 20K random-access memory (RAM) microprocessor unit that allows the interactive placement and editing of lines, circles, arcs, symbols and text, according to the firm. The unit features a "menu" picking function and free-moving cursor to assist the operator in drawing applications and also has a CRT terminal with keyboard to permit editing and annotating, a spokesman said.

The system can also be interfaced to several available plotters for final output, he added.

The Datagrid II Digitizer incorporates an expandable 16-bit, 8K RAM microprocessor, a large grid work surface, a powered lift pedestal base, a keyboard display console, cassette-loaded software and an applications software library, the firm said.

A digitizing program is included to guide the operator through the set-up procedure and then monitor the work for procedural errors by providing a display of prompting messages, a spokesman said.

The Interactive Mapping System costs $38,990 and the digitizer is priced at $18,990 from the firm at 3621 S. State Road, Ann Arbor, Mich. 48107.

MDS 2300 Gets Drum Printers

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. (MDS) has introduced two drum printers designed for remote job entry (RJE) and document processing applications on its System 2300 computer.

The models 2441 and 2442 use a 64-char. set rated at 600 line/min and 900 line/min respectively and a 96-char. set rated at 435 line/min and 660 line/min, a spokesman said. Both printers offer a 132-column format, he explained.

Price of the 2441 is $20,600 or it can be leased for $685/mo. The 2442 rents for $930/mo or can be purchased for $30,000 from MDS, 1599 Littleton Road, Parsippany, N.J. 07054.

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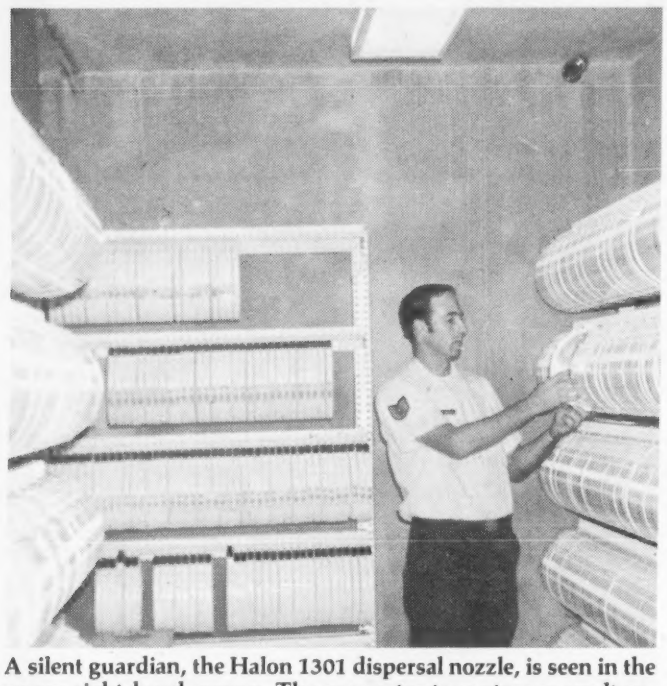
Air Force Picks Halon With Workers in Mind

TINKER AIR FORCE BASE, Okla. — The Air Force has begun using Halon 1301 as a means of chemically smothering a fire in a computer facility without exposing workers to the possible health hazards of a chemical fire suppressant.

Halon 1301 is an odorless, colorless, electrically nonconductive gas known to the chemist as CF^3Br, or monobromotrifluoromethane. To Air Force fire protection and DP personnel, it's one of the most promising improvements since the automatic sprinkler, they said.

The chemical is so effective that an average concentration of only 5% by volume, reached in 10 seconds, will extinguish most fires, an Air Force spokesman noted. This figure is even more significant when compared with the 40% concentration required for the commonly used carbon dioxide.

Halon 1301 is also safe and effective against all three classes of fires — Class A, cellulosic material: Class B, flammable liquid; and Class C, electrical, he said.



A silent guardian, the Halon 1301 dispersal nozzle, is seen in the upper right hand corner. The computer tape storage vault requires careful fire protection.

No Residue

The 552nd Airborne Warning and Control (Awac) Wing chose Halon 1301 because the chemical's two greatest advantages — cleanliness and personnel safety — were suited to protect high-value, high-voltage areas, according to the spokesman.

Water and other liquid agents were ruled out of the question; foam would have left a residue and might cause equipment damage.

"Products of combustion" methods unleashed corrosive agents, which are dangerous to both people and equipment, the spokesman pointed out.

So Halon 1301 was selected. As a vaporizing agent, it leaves no residue and it has no effect on the data which is stored on magnetic tapes, the spokesman said.

In addition, a single molecule of Halon 1301 is smaller than a molecule of air and will easily clear the head on a disk.

Following a 1301 discharge, there are only slight traces of smoke and a faint, acrid smell. Visibility is uninpaired and the low toxidity (Underwriter Laboratories classifies Halon 1301 in Group 6 — least toxic) means personnel can reenter the area where a fire has ocurred and resume operations immediately.

The most intriguing part of the Halon 1301 story is how it actually puts the fire out, according to the spokesman. It extinguishes by chemical action; it does not "smother" the fire by oxygen exclusion or cool the combustibles below the flame point or separate the fuel from its oxidizer.

Instead, the Halon compound reacts with the transient combustion products responsible for rapid and violent flame propagation. This reaction terminates the combustion chain reaction.

Halon 1301 is actually dispensed from pressurized, rechargeable storage containers through corkscrew-shaped nozzles. A blasting cap type of mechanism causes spontaneous release.

Being heavier than air, the gas moves down from ceiling to floor, "flooding" the area and rendering it inert. This method is appropriate for fixed enclosures such as computer rooms where underfloor areas containing wiring also require protection.

Halon 1301's low toxicity has been confirmed by the U.S. Army Chemical Center, Underwriters' Laboratories, Kettering Laboratory and others. All tests show the 5% concentration, for 10 seconds, to be extremely safe, the spokesman noted.

In fact, only at 7% concentration and higher, for prolonged periods, is slight difficulty in mental concentration observed, he said.

Safety Margin Proved

This safety margin was twice proven in actual operations at Tinker. Once the Halon 1301 system activated in the wing's flight simulator, the spokesman recalled, probably because of a power surge during a strong electrical storm.

When the fire department arrived three or four minutes later, Joe K. Clanton, the shift station chief, remarked "I didn't smell anything — no odor of smoke at all. A faint haze in the room looked like smoke, but there was no damage, no residue and no signs the gas had actually been released."

When Halon 1301 was discharged in the mission simulator (activated manually when a fire was suspected, a witness described the event like this: "I heard what sounded like a well-muffled shotgun blast. A few feet in front of me, I could clearly see the dispersal nozze and a narrow beam of grayish fog spilling out.

"But three feet from the tip, the gas became invisible. The flow lasted about three seconds, then nothing.

"Only a slight odor remained, not overpowering, but it reminded me of fish and burnt rubber and lingered for an hour or more."

A close-up of the corkscrew shaped nozzle shows how Halon 1301 gas is dispersed. The gas is broken into a 120° discharge cone of mist, heavy enough to settle from ceiling to floor and completely fill the room in approximately five seconds.

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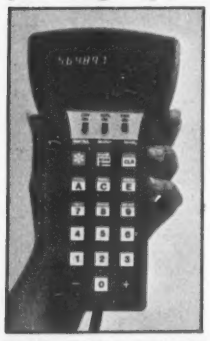

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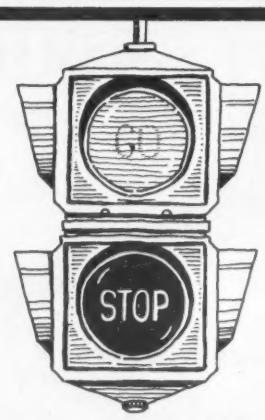

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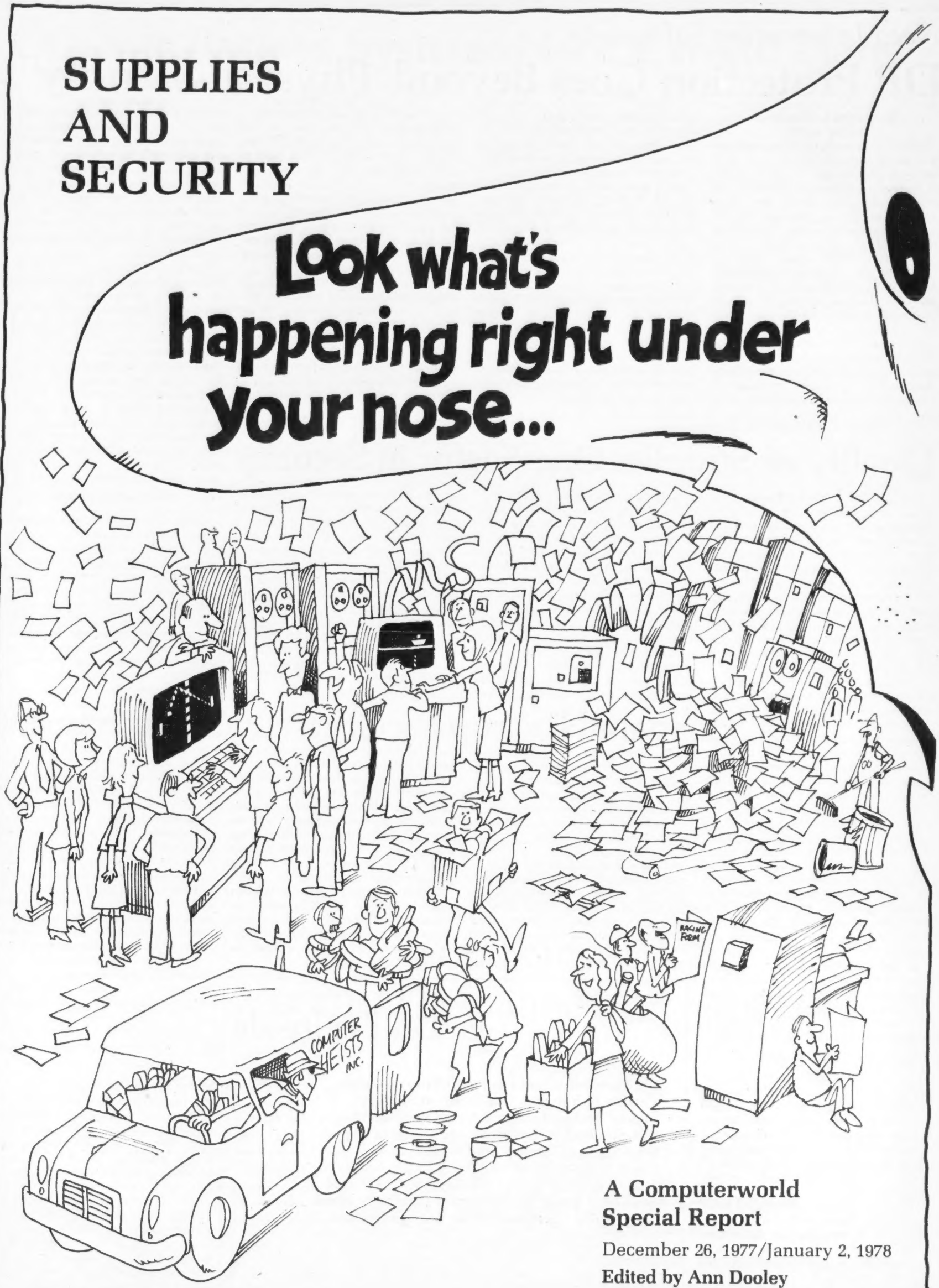

A Computerworld Special Report

December 26, 1977/January 2, 1978

Edited by Ann Dooley

Need Information Safeguards

DP Protection Goes Beyond Physical Security

By Stanley J. Murawski
Special to CW

Today, almost every organization has a physical security system to control access to the computer system in the data center. However, breaches of security that can have the most dramatic impact on a firm are directed at the information within the system, not the computer system itself.

It is estimated that today there are over 200,000 computers worldwide. By 1985, this figure will grow to over 450,000. The major growth area of computer usage is on-line and time-sharing networks where remote access to the system is widespread. And by 1980 it is estimated that more than 3 million terminals will be in use around the country.

If computer usage rises as estimated, and computer abuse grows proportionately, it is estimated that in the U.S. alone, we will incur an annual loss of well over $100 million from breaches of security.

Many managers have too much confidence in their computer systems. They do not realize the value of the information maintained by the computer system and have no true concept of how vulnerable that information is.

It is therefore important that data center management continuously assess their operations to ensure achievement of the proper balance between the operation of computer systems and the control of information assets.

The problem of increased system security arises out of a combination of management's information needs, new government regulations and the advancement of computer technology.

Managers at all levels have become increasingly dependent on the DP system for the information they need to plan, evaluate and control their organization's activities. Today's advanced economy has evolved to a point of extreme sophistication and so have the bases for our assets. We have moved from business based on physical assets to business based on a virtual asset — information.

Most of this information is stored magnetically within a computer system. In the banking industry, for example, banks hold assets of deposit on computer files. Most of the money in our economy does not really exist. Many of the stocks and bonds also do not physically exist.

Since in these instances computerized information represents the business, it has, in fact, become the business. This means that running the computer system efficiently may be one of today's most important organizational functions.

However, how much upper management attention is placed on the security of this operation and its information? Generally, very little; yet its loss could put them out of business.

Finally, the changes within the DP industry's technology have been rapid in order to keep pace with management's information needs and government requirements. For example, the phenomenal growth of data bsae and data communications systems is at the heart of a rapidly increasing ability to store and process information. The amount of information available for on-line access in many organizations would have been staggering to the imagination 10 years ago. On an IBM 360, today's systems would have been declared economically, if not physically, impossible.

Areas of Vulnerability

Vulnerability to computer abuse can come from many quarters.

Functional vulnerabilities include poor controls over manual handling of input/output data; weak or nonexistent physical access control, computer and terminal operations procedures; and weaknesses in business ethics. Others include weaknesses in the control of computer programs, poor controls over access through impersonation to time-sharing services and

(Continued on Page S/4)

End-User Education Essential

Quality of Supplies One Factor in Security

By Robert Phillip Baker
Special to CW

Security for a DP installation depends on whether the end user can become educated to the realities of the DP supply industry and marketplace. This education will ultimately lead to optimum performance at the computer site and conscientious management efforts. An operational axiom that can serve and benefit both a vendor and end user in achieving this education in security can be established.

The marketplace for DP supplies has matured and is now declining. Relative to most large industries, it has been volatile and swift in its evolutionary process. But here is the snag. Service to the end user has never been a reflection of the consumer's needs, but more often than not a reflection of the vendor's capabilities.

The marketplace is becoming increasingly competitive, supply being greater than demand, while at the same time the total service capabilities existing within the industry are not on par with the exact needs of the consumer. A sales and service organization is needed to fill the gap between what end users actually need and what they have been getting for products and service.

In an attempt to demystify these diverse products and bring some common denominator of quality, service and pricing into effect, the directors of Computer Supply Corp. began research into all areas of DP supplies.

Recycling Developed

Several years ago in this country, there was a sudden shortage of magnetic computer tape. Panic gripped the industry and was evident in almost every computer site in the country. During this panic an important yet extremely simple and virtually unknown concept was developed; recycle magnetic tape.

The basic logic of all recycled products is the reuse of the raw materials involved in manufacture. In this instance, recycling was made as simple as possible because the basic structure of the product did not have to be altered, only a duplication of the last stage of manufacture: cleaning, certification and packaging.

The existing quality standard for this product was researched and found to be inadequate. New product testing procedures and policies were adopted and refined, resulting in far greater performance. Today, "recertified" magnetic tape is being recognized as a viable and sometimes preferable alternative to the purchase of new tape.

Although as logical and necessary as magentic tape recycling is, the rehabilitation of the disk pack poses some minor manufacturing problems and some major marketing problems. The product itself is more complex and is, overall, what might be called a mechanical device, rather than a passive device such as magnetic computer tape.

If remanufactured improperly in any one of several stages, a reconditioned pack can cause severe damage to the drive upon which it is mounted. In recognition of these factors, careful consideration must be given to quality control and adherence to the exact specifications of manufacture of the

(Continued on Page S/4)

Shared Backup Facility Reduces Investment

By Louis Scoma Jr.
Special to CW

How long could your company stay in business should your computer center be destroyed? What would happen to your momentum? Your cash flow? Your competitive edge?

Answers to these questions could determine whether your company should establish a recovery operation center (ROC). One of the lastest developments in contingency/recovery planning, a ROC provides a company with an off-site facility from which it can continue its computer operations essential to the firm's success.

Off-site backup facilities were not necessary in the past because companies agreed to share their computers with one another. Typically, a company would line up two or three firms that would be willing to back it up should it have a problem — whether fire, explosion or machine trouble.

This arrangement is not practical for many companies today because they simply don't have the time on their computers to share. They generally depend on their computers around the clock, seven days a week.

Also, most computers are unique in their configurations and operating systems. It would require major changes and time to make two different systems compatible.

Companies with identical systems also could find themselves in a dilemma. For example, let's assume a computer operation requires on-line processing (i.e., the company's computer is connected to either another computer or a remote terminal at another workstation). While the user might be fortunate to locate a company

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Off-Site Backup Systems Need Careful Plans

By Eric Vesely
Special to CW

Most computer installations and users maintain backup capability in the form of tape copies of disks and tapes, usually stored off-site. This simple procedure was established years ago in an effort to protect the user from hardware malfunction, operator error and the like, which can destroy data essential to the everyday operation of the facility itself and/or manufacturing processes.

While most companies are now protected from loss of essential data, more and more concern is pointed toward:

- Loss of computer equipment.
- Loss of computer facility.
- Loss of programming/operations staff and their facilities.

These possibilities all exist today — when one considers the possibilities of sabotage, natural calamity and energy failure. What does a company do if it's entire computing capability is wiped out by, say, a major flood of the sort experienced in Kansas City this year? The disk and tape copies stored off-site provide no assistance if there is no computing equipment and staff to process it.

An event of this magnitude means destruction of the computing arm of the company. It can also slow down or completely halt assembly lines, marketing efforts, billing/accounting and financial measurements.

Every top executive must be concerned with this possibility — the possibility of catastrophe — and plan for such an occurrence.

One method of avoiding a disaster to the recovery process is to provide a backup capability with an identical configuration to the original. (If it is *not* identical, then plans must be made to convert all existing programs immediately so they can execute on the backup configuration.)

As new programs are developed, they too must be converted. Of course, the objective is to minimize the conversion costs. Also, where the concern is for a catastrophe of larger proportions such as a major earthquake affecting a large area, backup capability might also be arranged outside of the local area.

Another method is to establish operations staff contingency planning. Under a catastrophe condition, do they move to the backup facility? What are the costs, be it a local or distant backup facility?

A third method of disaster recovery is to provide programming and analyst capabilty. In order to continue program maintenance and development, a backup site (not necessarily the same as the computer backup site) must be planned for.

These are only three major considerations which should be of utmost importance to any executive concerned with the well-being of his company. Obviously, there are many more such methods, and many of these will relate directly to the specific type of computer operation being handled.

Don't tell yourself you have a handle on the problem until you can respond yes to all the following questions:

Do I have storage that protects my off-site data from partial (i.e., warp, water damage) as well as complete (i.e., fire) destruction.?

Do I have signed agreements for hardware backup, specific hardware and detailed personnel plans in case the unthinkable happens?

Have I run tests on my backup hardware, checked for mismatches in the system and corrected these?

Do I continually review my plans, look for problem areas and update regularly in light of changing conditions?

Vesely is vice-president of Systems 37, a software and service firm.

Bank Backup Ensures Confidence

By Fred G. DaCosta
Special to CW

The banking community is unusually dependent upon the public's confidence, not in any one particular banking corporation, but in the industry as a whole, to withstand the winds of monetary, fiscal, political and social change. Within the DP world, the industry also recognizes the potential for confidence loss caused by an interruption in banking operations of any one member of that industry.

Thus, many members of the banking fraternity have recognized it is in their respective best interests to ensure that the very financial institutions with whom they compete will be allowed to process critical bank applications on one another's compatible hardware/-software in the event of an emergency.

We know, of course, that procurement of computer time at a compatible site (possibly that of a competitor) is dependent upon a number of conditions, not the least of which is the availability of unused system time at the donor site in view of the latter's daily work requirements.

The term "competitor" is employed here with deliberation, for it is essential to remember that most banks are dependent upon magnetic ink character recognition (Micr) reader/sorters for the input processing of their high volume applications; thus the building of input files cannot necessarily be accomplished at just any CPU-compatible location. This competitive condition is alleviated when the backup (donor) site is located at a point outside city, county, state or other regional competitive barriers.

In any event, peripheral requirements may dictate the selection of another bank data center over that of a manufacturer with whom the distressed institution had maintained a healthy business relationship.

Preconceived Idea

Thus it is critical that the distressed bank have a preconceived idea of what applications are the most important in order to continue operations the following business day. Perhaps only four, six, or eight "wall-clock" hours of computer time will be available to the troubled institution. Thus, the need arises to determine which modules, programs and software are extraneous, relative to users' minimum requirements.

The same logic applies to the donor bank. There is a reciprocal aspect to the relationship between the two banks in question. Internal or external emergencies may require "today's" donor to be "tomorrow's" user of "borrowed time." The need to accommodate the distressed bank today requires some degree of imagination on the part of the donor installation, perhaps some compromise of its ordinary processing cycles. It is, therefore, equally important for the potential donor installation to assess its minimum requirements and forego the execution of certain jobs ordinarily processed.

The establishment of priorities of system and application processing is not a spontaneous one, to be made under crisis conditions. In fact, the sophisticated organizational structures of many financial institutions prevent such a decision, or at least the authorization and approval of same, from being made by any one individual.

The bank's DP department, functioning as a user servicing division, may likely recommend actions from a hardware utilization standpoint. But the senior management representatives of demand deposits, commercial loan, payroll/customer services, savings, trust, mortgage, etc., have been known to discuss at length the relative importance of each of these applications prior to determining the processing sequence of those systems.

In particular, the issues of which programs are to be deleted, and which reports are not absolutely necessary to users, constitutes an area of much contention. On the other hand, contractual arrangements with customers may preclude certain deletions.

In addition, certain constraints are introduced when the programs of one system, e.g., payroll, require access to the files of another system, e.g., savings, demand deposit, automated clearinghouse.

Still another by-product of such decision-making exists in the utilization of this "game plan" within one's own environment, following recovery from conditions which earlier had deprived the data center of its ability to process. That is, the same priorities can be employed in-house to provide users with not less than a minimum of required data within hours.

As with all aspects of contingency processing plans, it remains that sufficient forethought and periodic review of these matters is warranted to ensure the concept's continued applicability.

DaCosta is a national bank examiner at the office of the Comptroller of the Currency of National Banks.

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Data Protection More Than Physical Security

(Continued from Page S/2)

weaknesses of tape control.

Violations in these areas can produce loss of data integrity, loss of data confidentiality and loss or delay of system availability.

Considerable sums of money have been and will be invested in physical security — both physical access and fire protection. Basic physical protection is an absolute necessity. However, far too much of the security investment has been made in these areas of relatively low exposure.

About 50% to 80% of all losses are due to errors or omissions. Ten percent to 15% of the losses are the result of disgruntled or dishonest employees. These statistics illustrate the relatively low importance of physical security.

In the area of data integrity, management must consider those times when data has been exposed to accidental or malicious alteration or destruction as well as incomplete data. Data confidentiality can be violated by the misuse of information by those authorized to use it for limited purposes or by lack of protection from unauthorized exposure.

Finally, system availability should be considered. This is when the system isn't available and functioning to fulfill information needs.

The next step beyond physical security is the establishment of controls over access to and updating of important information within the computing system, or "logical security."

Since the vast majority of losses are accomplished by the organizations' own employees (either through errors or intent), it is logical then to limit the capacity of users to access information they might consider "their data."

This means specific functions should be authorized as opposed to the users of that function. For example, the jobs in the payroll system should be allowed to access the payroll master, but only if they are running payroll programs and only at the time these jobs are scheduled.

This concept of "functional" authorization is quite different from authorizing the people in payroll to do anything within the payroll master.

Considerable discussion has been carried on regarding logical security. However, it is a bit like the weather. No one has done much about it.

One of the reasons for this lack of action has been a failure to specifically identify the heart of the problem to be solved. The other, of course, has been the lack of reasonable solutions in terms of implementation, operational cost and ease of use.

Some noble experiments have been conducted and some impressive systems developed. However, few have proven generally feasible when evaluated for long-term use by commercial organizations.

A logical security system must be able to fit into the existing organizational and DP structure with a minimum amount of disruption. It must be flexible enough to allow for existing shop standards on data sets and users names as well as accounting information structure.

The user should be able to migrate into a protected environment in a step-by-step fashion as data is added to the body of protected information.

Possibly the most important information to protect is the software system. This includes both vendor-supplied software as well as in-house applications programs. An organization's software investment is enormous. Its loss could easily cause the failure of a company.

Because of this, the operating system load libraries — those libraries essential to the operation of the computer — should probably be the first items protected. The next order of priority should be the general system libraries and critical production load libraries.

Once this is done, a continuing comprehensive protection scheme should be developed.

The ultimate question to be anwered by data center and corporate management alike is how well will the company function without some, part or all of its computerized information.

If the answer to this question is poorly or not at all, then it's time to look at the total computer security picture. That goes beyond locks on the doors. It includes protection of the information within the system — a company's most important and valuable asset.

Murawski is product manager for Boole & Babbage's Operations Division.

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Quality of Supplies Plays Role in DP Site Security

(Continued from Page S/2)

original product.

The third and last recycling concept is one that at the time was not "new," but presented several challenges in the way of quality enhancement and more competitive pricing and delivery. The product and an industry-wide negative concept was termed "reprocessing." As stated, the basic logic of the recycle was already in existence, but with more research it was found that the current remanufacturing process was extremely limited and entirely unsatisfactory, resulting in a "second class" product and an industry-wide negative stigma. This necessitated the development of certain proprietary techniques, again reaching that place where the recycled product was to perform at least as well as the original product, if not better, as in the case of printer ribbons.

Recycling Vital

The logic of recycling included the common denominators of quality and pricing. The recycling process enables end user unit costs to be lowered anywhere from 50% to 300%. Here we have "smart" selling and reflectively "smart" buying. Recycling is not only logical, based upon materials utilization, i.e. cost savings, but becomes vital when conceptualized as an overall philosophy toward supplies and security.

One-half of the project to identify consumers' needs and how to fulfill them was completed in that now the DP supply user was educated to the benefits of recycling and could opt for recycled products, thus obtaining optimum value and performance.

Before total security could be guaranteed, however, a still larger void had to be filled. The specification and application of the product consumed ran parallel to a tenet of total commitment of service. A simple and honest guarantee was needed that reflected the esteem of the DP personnel and the integrity of a supplier. Any product, for any reason, at any time could be returned for replacement or refund.

The archetypal sales manipulation, where a customer must be concerned with being misled or taken advantage of by a salesman, was no longer necessary. Rather a customer should be able to learn and gain understanding through the salesman's expertise, though objective analysis by the salesman of a customer's need might result in directing the consumer to purchase from a more qualifed vendor, one that could even better serve the customer's needs. This is the salesmanship of a sales professional.

The best way for the consumer to obtain a product, then, is to deal with an organization that will be objective about his needs and will supply him with accurate and informative data to help him answer any and all questions.

Baker is president and chairman of the board of Computer Supply Corp.

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Shared Backup Facility Lowers Investment

(Continued from Page S/2)

with time to share and with a compatible configuration and operating system, the user would still be unable to operate the on-line processing job because its communications system would not be connected to the other computer.

Many managers also think computer manufacturers can supply them with a computer and have it installed in a "couple of days."

Unfortunately, managers who operate on this assumption do so with a false sense of security. Although computer manufactuers will try to get a computer to a company as quickly as possible, it will take them longer than a "couple of days" to set it up — and that's only one piece of the puzzle.

When disaster strikes a computer center, it often means electricians, communications specialists, contractors and other suppliers must be called in to rebuild the facility. A firm might have a new computer, but no place to install it for several weeks or even months.

Contingency Plan

Before setting up a ROC or becoming a member of a group that plans to share in a center, the user should conduct a thorough risk analysis of the company's needs and develop a contingency/recovery plan.

The risk analysis will determine the effect and losses the company would have in its business momentum, competitive edge and cash flow should its DP center be destroyed. The study also should reveal the essential data necessary to operate during an emergency.

To help define, quantify, set priorities and put into perspective the major objectives for development of an overall corporate plan, a five-phase approach is recommended. Typically, a phased approach tailored to meet the needs of a company is beneficial from the standpoint of resource utilization and establishment of objectives. It also provides

- Update and finalize project schedule to completion.

Phase III — Analysis

- Problem resolution(s).
- Cost analysis.
- New or revised procedures as required.
- Outline for emergency recovery documentation.

Phase IV — Preparation of Plans

- Emergency actions, training and recovery checklists.

Phase V — Test Plan

- Develop scenario, conduct recovery exercise, post-exercise workshop.

By compiling this information, a user will be able to decide if a ROC would be a feasible investment. If it is, the next step would be to evaluate data pertaining to cost, operational requirements and location.

Cost is a factor. The user might find it's too expensive to build an off-site computer center only for his company as insurance on a "what-if" basis.

ROC Network

To reduce that expensive initial investment, several companies are planning to participate in a national ROC network in their own areas.

The ROCs will provide each member with its own necessary data communication network for on-line processing, electrical power, air conditioning, raised flooring and equipment that will require a long lead time to order such as communication modems, scanners and check sorters — all of which are essential for some corporate computer operations.

The cost to prepare a ROC is estimated to be approximately $750,000. However, with 10 members sharing the facility the cost per member would be $75,000 before taxes, or $39,000 for each member after taxes, if all costs are shared equally.

This makes it a reasonable investment for a corporation to prepare a ROC to back up its computer operations.

Operational requirements for each member firm would vary. For example, one member might need 10,000 sq. ft. of raised floor space while the others might be able to get by with a minimum of 2,500 sq. ft. of raised floor space.

Location is important. It should be within reasonable proximity to its members and it should be in an area reasonably safe from earthquakes, tornadoes, floods, hurricanes and power shortages.

Additional questions which must be answered include: How many personnel will be assigned to the center? How many shifts will be required? What services — such as security guards, janitorial and parking — will be needed?

The manner in which a ROC is used varies from company to company. Some groups plans to use it only until their primary computer centers are repaired and in operation. Other groups are thinking about installing a computer in their ROC to use for testing and systems development projects. This will enable them to take a load off the day-to-day demands made on their primary computers.

Of course, all companies don't need a ROC.

But for companies that can't afford to operate without their computers for any given period of time the ROC may be a whole new approach to security.

Scoma is president of Data Processing Security, Inc., a computer consulting firm.

If a fire destroyed your company's computer center, how quickly could you recover?

periodic milestone reporting of progress and problems to senior management.

The five phases are:

Phase I — Initial Planning

- Orient staff on contingency/recovery planning.
- Develop objectives, goals and responsibilities.
- Determine scope of activities.
- Develop inital task/task force work matrix.
- Review and analyze existing documentation, studies and reports.
- Develop initial milestones, project definitions and resources.

Phase II — Fact-Gathering

- Assemble inventories of files, systems, applications, documentation and other computer-related components.
- Define problem(s).
- Specify guidelines for non-DP requirements such as insurance, legal and auditing.

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Using Cost-Effective Methods

Good Security Based on Detailed Risk Analysis

By T.Q. Stevenson
Special to CW

Concern for security has grown rapidly in the past several years. Good security is based on a risk analysis, which helps determine where possible exposure is and how much there is. It also helps tell the manager what could be done to reduce the exposure and how much the reduction will cost. However, risk analysis can itself be expensive. So it should be performed with careful forethought and use of cost-effective methods.

The general activities in risk analysis are:

• Gaining a commitment by management to undertake the study and to act upon its recommendation.

• Setting up a risk analysis team which represents the key units involved in data processing.The team should have a clear charter and corresponding authority to conduct the study.

• Defining need for security. Defining security needs includes evaluating the sensitivity of items in the DP environment to compromise. The data and software, the processing of data and the capital investments in facilities and equipment have certain values to the DP organization and to the owner of the data or software.

A possible intruder may also assign a worth to these items. Compromise may be by disclosure for data and software or by modification or destruction of data, software, processing operations, facilities and equipment.

Sensitivity Categories

A compromise may also be just a slowdown in processing certain data. Sensitivity should be measured in four categories: data integrity, data confidentiality, operational reliability and asset integrity.

Defining a need for security should also include evaluating potential costs of loss if a compromise should occur in the four sensitivity categories. These costs should also relate to values to the DP function, user (subject or data owner) and to any possible intruder. Does data value decrease with time, is a program proprietary, is money handled or is inventory data processed? Answers to these and other questions are required to properly evaluate costs of loss.

Another aspect is evaluating possible threats which may cause compromise to occur in the four sensitivity categories. These should be lists of reasonable types of occurrences. The lists should include those small, apparently harmless problems such as temporarily lost files, misrouted output, etc. Complete scenarios and simple events should be considered.

Calculating the annual cost of loss is yet another aspect. This value is often labeled the Annual Loss Expectancy (ALE). The ALE is the sum of the products of potential costs of loss and frequencies of compromise for each sensitivity category. The installation ALE is the sum of the category ALEs.

• Evaluating existing security by the four categories — data integrity, data confidentiality, operational reliability and asset integrity. One must know current conditions to make improvements. The results of this activity should correlate and be compared with those of evaluating sensitivity. Weak areas are easily identified as well as areas which may be overly protected.

• Designing protective measures from the results of the sensitivity, threat, frequency and ALE evaluations. These measures will identify which applications or assets will have average or high protection, as well as where risk exposure will be tolerated.

The strategies may separate or combine treatment of the risk by sensitivity category. Then the specific detailed safeguards can be analyzed.

Finally, the specific protection measures should be assembled into two or more proposed systems of protection. The costs and loss reductions for each proposal are required along with cost per dollar of loss reduction.

• Reporting to management is the final step, but communication to management should not be limited to this activity. It is required throughout the analysis to inform and to help develop a prudent security system. The final report should propose at least two options.

These general activities are sometimes combined or rearranged depending on the particular method of risk analysis. A good method considers all items in the DP environment, but requires minimal labor and time while yielding valid results.There are several possible techniques for reducing costs, including simple sensitivity ratings, sampling procedures and order of magnitude estimation.

An important concept related to risk analysis is that it is a task which should be conducted periodically. Conditions change from year to year and the first study may yield results which are hard to validate. Subsequent studies will accommodate changing conditions and refine and support prior work. Objectivity and reasonableness of estimates are essential also for validity.

Stevenson is a computer specialist with the U.S. Department of Agriculture.

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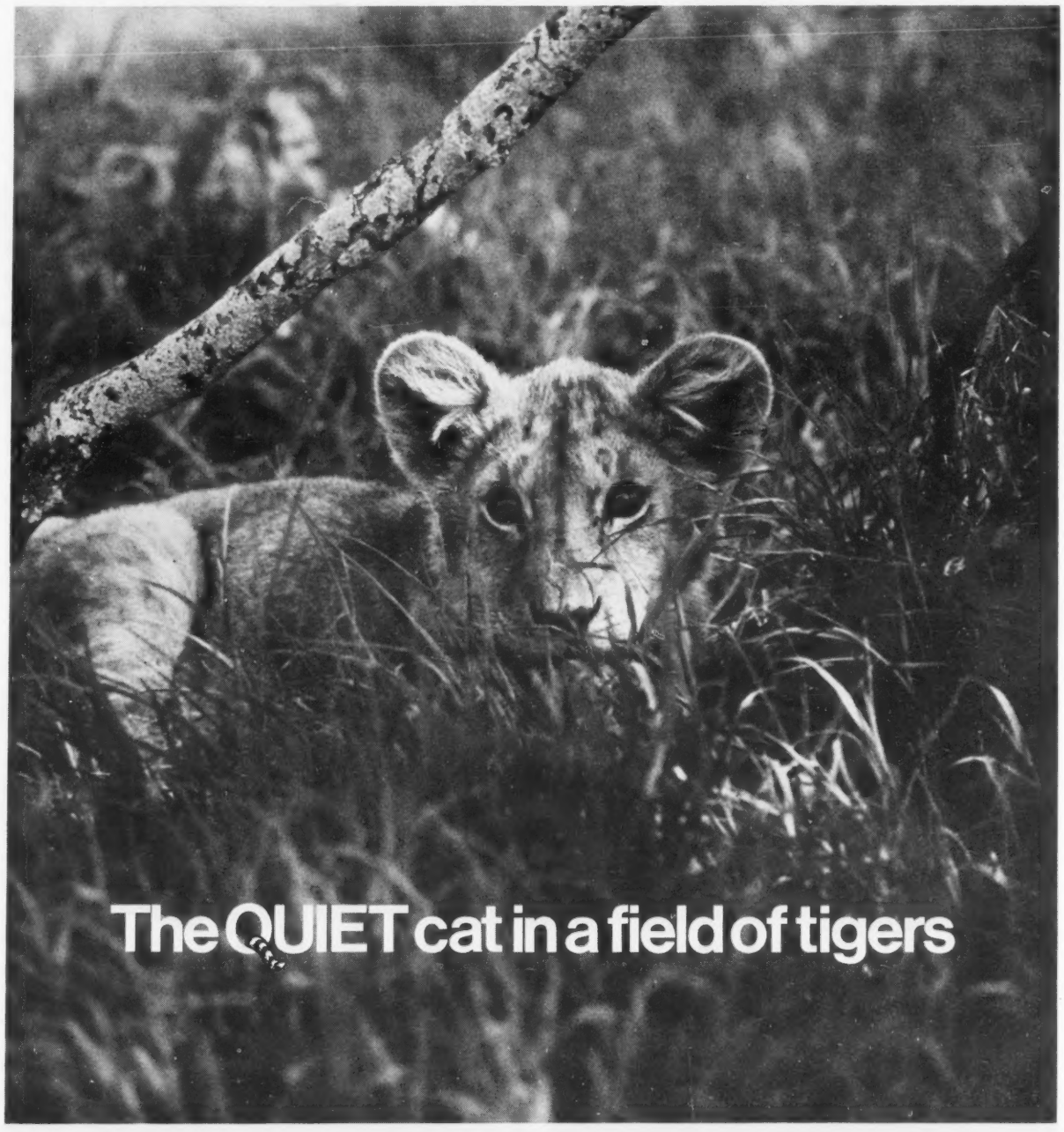

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If you are waiting for the next 3270-type product to come on the market, wait no longer. For the PTS/1200 is far more powerful, cost efficient and adaptable—in a 3270 environment—than any product you can find today. And you can take delivery in just 30 days.

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- ✓ Perform multiprogramming functions
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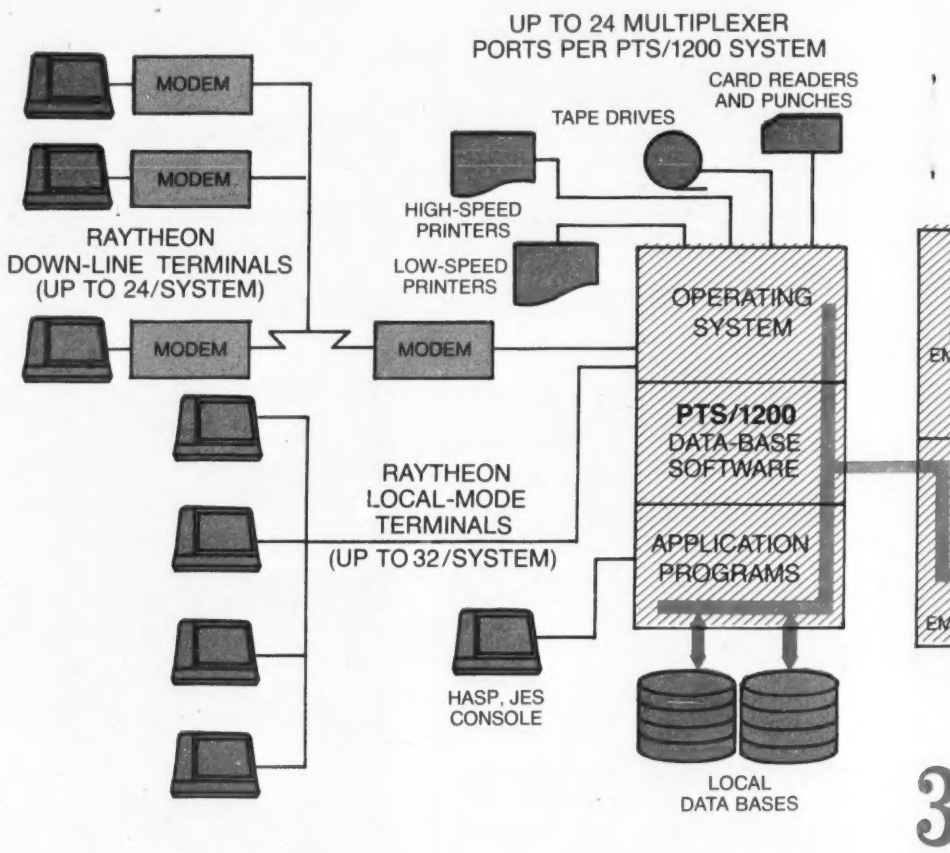

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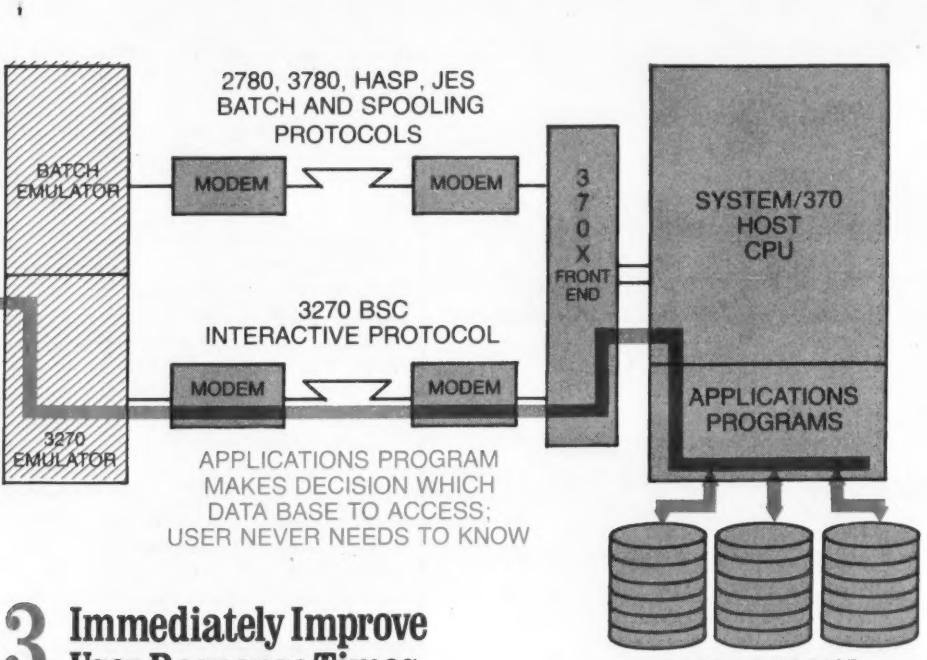

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Wide Range of Tape, Disk Capabilities Offered

By S.H. Tullman
Special to CW

The evolution of computers into machines of various looks, sizes and applications has brought a corresponding growth in magnetic media such as computer tape, disk packs, disk cartridges, data modules and floppy disks.

The important difference between tape and disk is in the way the information is organized and stored and consequently used by the computer. On computer tape, information is stored and has to be processed in sequence, whereas on disk products, information is stored in specific places on the disk and can be reached at random.

A simple example is processing the information on a name and address file. On tape, all names would be listed alphabetically from Aaron to Zwicker, and if you want to change Zwicker's address you would have to read all the way through the tape to find Zwicker. But on a disk you would skip all of the areas with names from A to Y and look only where the Zs are stored, so you would find Zwicker in a fraction of a second.

So time is a key factor to consider when deciding which type of storage medium to use. Whereas tape can store much more information for the money than a disk can, tape is quite slow. A tape recorded at 1,600 bit/in. could contain as much information as a whole disk pack and cost as little as 10% of what that particular disk pack costs, but it may take much more computer time to process tape-stored information.

The most common and oldest of all the media products is computer tape. It is generally 1/2 in. wide and comes in lengths from 200 ft to 3,200 ft and a common version is a 2,400 ft roll on a 10-1/2 in. tape reel.

Today most tape is written at a density of 1,600 bit/in. on 9 tracks. If one compares that with the familiar punched card it means the 2,400 ft reel can store as much data as 250,000 punched cards.

Most manufacturers offer a premium and a regular grade of computer tape. The usual difference between the products is how thoroughly and to what standards the product has been tested or certified. Certification generally means data has actually been written on each reel and then read back to make sure there were no errors.

Tape is manufactured by coating wide rolls of polyester film with an oxide mixture, which looks like light brown paint. This coated roll is then slit into 1/2 in. wide tapes which are then wound into individual reels.

The slitting process is an especially critical manufacturing step. Since oxide is like paint, a sloppy job of slitting tape will literally produce a ragged edge of oxide which can shed debris on the tape during use and produce errors.

After slitting, the tape is cleaned and checked to make sure it will meet all necessary specifications. The coating, slitting, cleaning and testing of computer tape is all done in special "clean room" manufacturing areas.

Over the last 10 years tape has generally become less expensive while improving in quality. Prices are not expected to fall any further and at approximately $10 to $15 a reel, tape is what *Consumer Reports* might call a "best buy" in magnetic media.

Disk Media

The other most common media products are disks, which include disk cartridges, disk packs and data modules. Disk cartridges generally consist of one platter or disk inside a sealed plastic housing. Disk packs have stacks of platters, as few as three or four or as many as 12.

Data modules are the latest generation of disk packs and these have read/write heads and access mechanism built right into the unit. (Regular disk packs do not.) Disk packs are just stacks of platters the read/write heads and access mechanism are part of the drive.

A disk works in much the same way as a record. Let's say that you only want to hear one line of a song and that line is in the 10th groove. You could put the tone arm right into the

(Continued on Page S/12)

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'Planted' in Cabinet

Simulated Bomb Threat Uncovers Security Holes

By Ken Lord
Special to CW

Many companies have an emergency disaster plan to protect their computer equipment and data, even though such a plan is rarely or never tested.

Other companies do not even have a plan. One such company was concerned about security and protection of its facility and in 1975 hired an investigator to study its security needs.

One section of that investigation simulated a bomb threat emergency and occurred as follows:

The investigator planted a small package — a white jewelry box tied with a pink ribbon and containing a note — inside the communication cabinet of the facility's computer.

The next morning, the investigator advised an employee of the existence of a simulated emergency and presented him with a list of persons to be assembled in a meeting. Representatives of all departments met with the investigator in the facility's conference room, where he announced the existence of a planted "bomb" and stated the group had 45 minutes to find it.

It would seem logical that the facility should have:

- Had a plan for such a contingency — other than just notification of civil facilities. No such plan existed.
- Planned for leadership for the search of the facilities for the device. No search assignments were made.

The search had been localized by the investigator as being in or around the computer facility, in the manner of a telephone call which might have been received from a perpetrator. Among the non-DP personnel present, there seemed to be general confusion as to what they should do. Some communication was passed to areas under their supervision, but generally those people merely took part in the search — with no concept of what they were looking for, the areas in which they should look for it or how to go about it. Their interest was admirable, but the following things were observed:

- Rumor ran rampant through the facility.
- People had no concept of how to open cabinets to look inside them.
- Cabinets that could be searched were searched several times by various people.
- There was no organization to the search, either on the part of the DP people or non-DP people.

Search Narrows

At this point, the search was localized a second time by the investigator. He declared data entry, user areas and the tape library free areas and further ruled out the necessity for above-the-ceiling and beneath-the-floor searches. This may well be a luxury not permitted by the perpetrators of such an incident.

When half the alloted time had been used up, or the point at which the facility should have been evacuated, the investigator terminated the exercise and located the parcel for the searchers. It should be noted that it was subsequently determined that at least two people had searched in the cabinet where the parcel was located, in the back of a wide-open cabinet. The meeting was reconvened in the conference room.

In the subsequent meeting someone pointed out that the investigator could easily place the parcel since he had easy access to the facilities. But the investigator contended the parcel was placed in a cabinet approximately three feet from the computer's CPU, a distance roughly equal to the distance between the CPU and the outside wall of the computer facility (on the assembling side) where the "bomb" could have been planted by a perpetrator without access to the computer facility itself.

Is such an incident possible? The preponderance of evidence suggests it is. The facility has had some bomb scares. How valid are bomb scares and bombing incidents nowadays? Merely four days after the inspection, 10 incendiary bombs were placed in various department stores in a nearby city. Admittedly these were planted by a group of militants during a convention. Not relevant? Perhaps. Suppose such a group chose to demonstrate its demands in an action against this company?

On the day following the simulated incident there was, among facility personnel, keen interest as to when the planting of the package had taken place — in other words, "Whose fault was it?" Fault is not at all the question. Clearly, everyone was at fault. There was ample opportunity for the investigator to place the package in any place at any time on any shift.

It should be noted that some of the managers had little understanding of what was important to remove in time of crisis. One person, for instance, in a later discussion with the investigator, indicated she had no idea what records should be removed should a real incident occur. The woman who handles payroll indicated she did know what documents to remove, but observation of those documents gave no indication of their importance in order to permit someone else to evacuate the "books of record," should she not be available.

(Continued on Page S/13)

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Wide Range of Storage Capabilities Available

(Continued from Page S/10)

10th groove and play it. Now just consider a stack of 10 records bolted together with perhaps an inch of space between the records. You put this package on an unusual looking record player with 9 tone arms and two needles (top and bottom) on each tone arm. This player can play all records simultaneously. That is a picture of what looks and functions like a disk pack and a disk drive.

These disk packs spin as fast as 3,700 rev/min while the heads fly across the disk without actually touching it to locate a precise spot on any one disk and read the information.

Disks can store tremendous amounts of information. Disk cartridges store from 500K bytes to more than 3M bytes, while the largest disk packs can store 300M bytes. A 100M byte pack, for instance, can store the names and addresses of the entire population of Switzerland. And the disk drive can retrieve an address on that pack in about .03 sec.

The first step in making a disk pack is to coat aluminum disk with an oxide (paint-like) formulation. These disks are then baked to bond the coating to the aluminum and finally polished to remove any irregularities. The coating and polishing operation is a very sophisticated and usually highly guarded secret of each manufacturer, for it is here that the recording capabilities of the disks are determined.

Finished disks are assembled into various disk pack models, which are further tested or otherwise prepared for use in a computer system. Disks are very sensitive and require a clean and air conditioned environment. Because the read/write heads fly over the fast spinning disks on an air cushion much smaller than the diameter of a human hair, a particle of dust or some other contamination can abruptly end that flight in a crash onto the disk surfaces and in the process destroy a lot of stored information.

There are many kinds of disk models. Disk cartridges, for example, come as "front loaders" and "top loaders" which of course refers to how they are "loaded" into the computer.

Disk packs also come in many models that are referred to by names like "11 High" and "12 High" (refers to the number of disk in the stack) or 3330s and Trident (refers to the name or model number of the drives that the pack fits on.)

Data modules are a special kind of disk pack which have the heads built right into them. Data modules are expensive, but can process the data extremely fast so that they are in fact a rather efficient storage device.

Disk pack prices range from as little as $100 for some cartridges to more than $1,500 for data modules.

Flexible Disks

A product that offers the best feature of tape and disk storage is the floppy disk, also known as a diskette or flexible disk. It is an inexpensive storage medium like tape but provides addressable information storage like a disk.

The floppy disk (the most common version today is recorded on one side only) holds as much information as 2,000 punched cards and can provide information from anywhere on the disk in less than half a second.

The disk, about the size of a 45 RPM record, is cut from a plastic film, much like comptuer tape film, and is placed and sealed into a special PVC jacket. This jacket serves as a loading device and has a liner which continually cleans the disk.

The head (the read/write magnet) moves across the diskette and unlike the "hard" disk, the head actually touches the flexible disk. Consequently, the ability of the media to perform without wearing out (rubbing the coating off the disk) is an important product quality.

There are a number of flexible disk models available. Some of the newest models have achieved greater recording densities by either one or two changes to the standard floppy disk: one model doubles the data stored on one side by writing twice as much information per track (referred to as a double-density model) or by using both sides of the disk a new model is doubling the data that can be stored on each diskette (referred to as a double-sided diskette).

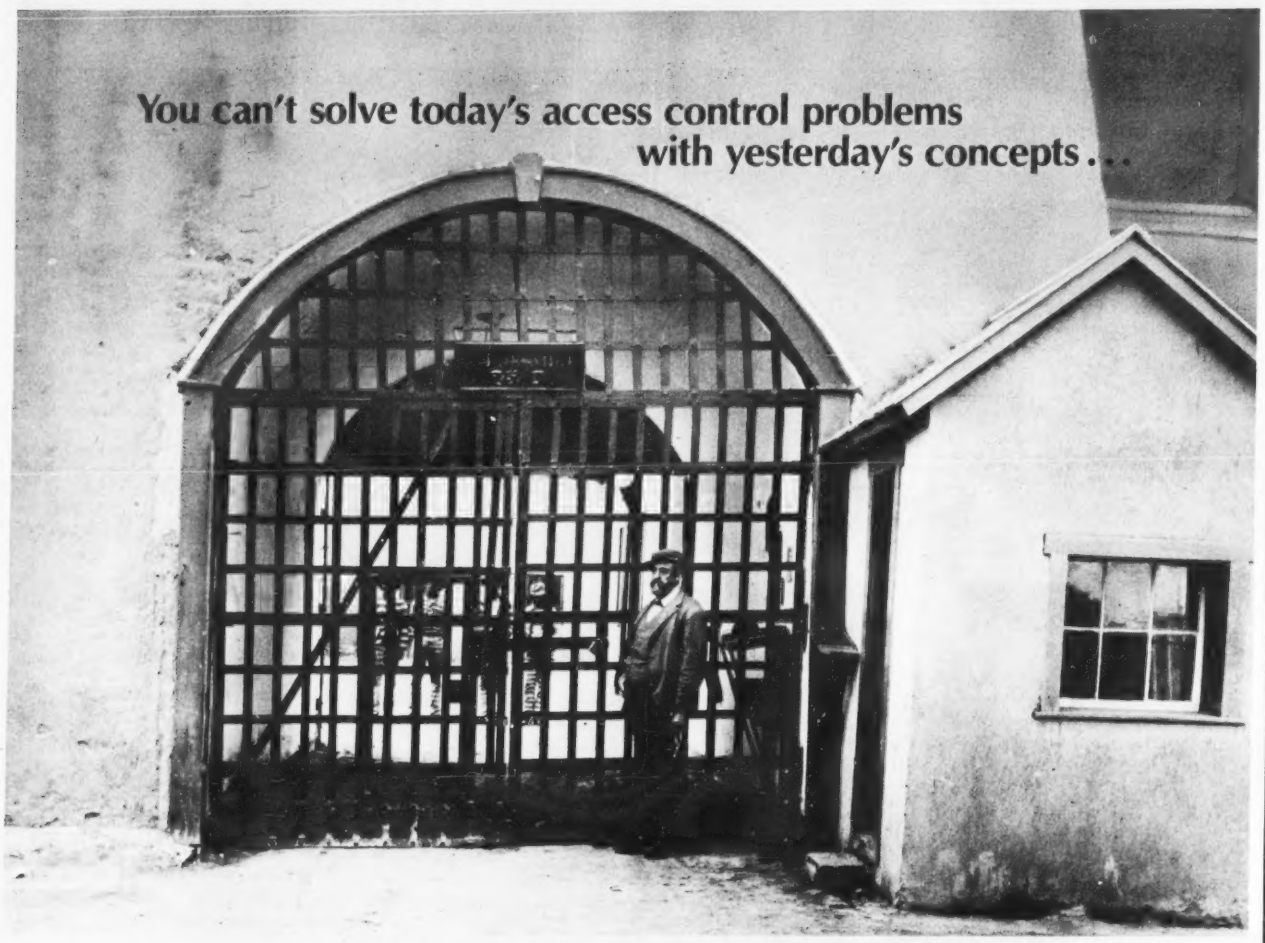
There has also been something called a "flippy" floppy. It can be used on both sides, but the user actually pulls the diskette out of the drive, turns it over and puts it back, whereas a regular double-sided diskette is written/-read on both sides by the drive and does not need to be removed and turned over. This is like playing both sides of a record without having to flip it.

Future models will allow double the data on each side of the disk and will use both sides — in essence quadrupling the available storage capacity.

Prices for the floppy disks fall into the $5 to $8 range. Double-sided, double-density and mini diskettes cost slightly more.

Magnetic media products are like people. They are not always perfect and need special care. They only like to function in climate controlled and clean environments. Dirt, dust and rough handling are not welcome. But if properly cared for they can do an incredibly efficient job for a very long time.

Tullman is product manager of Computer and Business Products for BASF Systems.



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Instead of Tapes, Disks

Mag Cards, Cassettes Provide Storage Options

By S.H. Tullman
Special to CW

For the user who is looking for an alternative to tapes and disks, digital cassettes and magnetic cards could be the answer.

The Phillips-type digital cassette looks like the very familiar audio cassette for cassette tape players and is used for data entry, data storage, point-of-sale terminals, archival retrieval and power typing applications. The only differences between audio and digital cassettes are in the tape used and in the internal design.

Digital cassettes are loaded with computer tape, not audio tape. And the accuracy and speed demands made on the digital cassette are met by a much more precise tape guide system, pressure pads and a sturdy housing which can always be opened by removing the five screws.

Besides the regular Phillips-type there are two other kinds of digital cassettes available. One is the 3M Corp. data cartridge — about the size of an 8-track audio cartridge — and the other is the mini digital cassette — simply a miniature version of the Phillips-type cassettes.

Cassette Features

Digital cassettes record information much like a computer tape and can store the same amount of data as 4,000 punched cards. These cassettes are easy to load, easy to mail and quite rugged and costs about $10.

Last but not least is the magnetic card, which is used on IBM's Magnetic Card Standard Typewriter and similar machines. Although the "mag" card is mostly thought of as a "word processing" rather than a "data processing" medium, it is a digital storage medium and manufactured like computer tape. The coated film is slightly thicker than tape and instead of being slit into ribbons, cards are punched from the film.

The most common use of cards is on "automatic" typewriters. Here the card functions like the paper roll in a player piano. The letter instead of the song is recorded by magnetic pulses rather than holes and after the card is put into a slot, the typewriter cranks out a letter or whatever.

The magnetic card is the same size as the popular punched card. But the important difference is that the information is electronically recorded on the mag card, while on the punch card the pattern of punched holes determines the retreivable information. Each card has enough storage capacity to record up to an average two-page business letter. But the actual capacity is dependent upon the design of the machine.

Most cards are sold in file boxes of 25 cards and cost anywhere from $15 to $25 a box.

Tullman is product manager of Computer and Business Products for BASF Systems.

Firm Discovers Security Holes

(Continued from Page S/11)

On the subject of payroll records, it should be remarked that the cabinet in which these records are maintained is anything but secure. While the cabinet may offer some fire resistance, albeit marginal and dependent on the correct functioning of the overhead sprinkling device, the cabinet itself is not secure and its plastic front can be opened with a common jacknife. It was observed by the investigator that there seemed to be in other areas little knowledge of what records to remove or any program of common marking for identification of such records for evacuation.

Some recommendations for improving security include:

- More concentration on security concerns by either the present security officer or other officer designated for the purpose.
- Establishment of rumor control procedures.
- The immediate development of organized searching methods and training of people in those methods.
- The immediate development, in association with the police, of a comprehensive security program.

This article was excerpted from the book The Data Center Disaster Consultant *by Kenniston W. Lord, Jr. and is available from Q.E.D. Information Sciences, Inc., 141 Linden St., Wellesley, Mass. 02181.*

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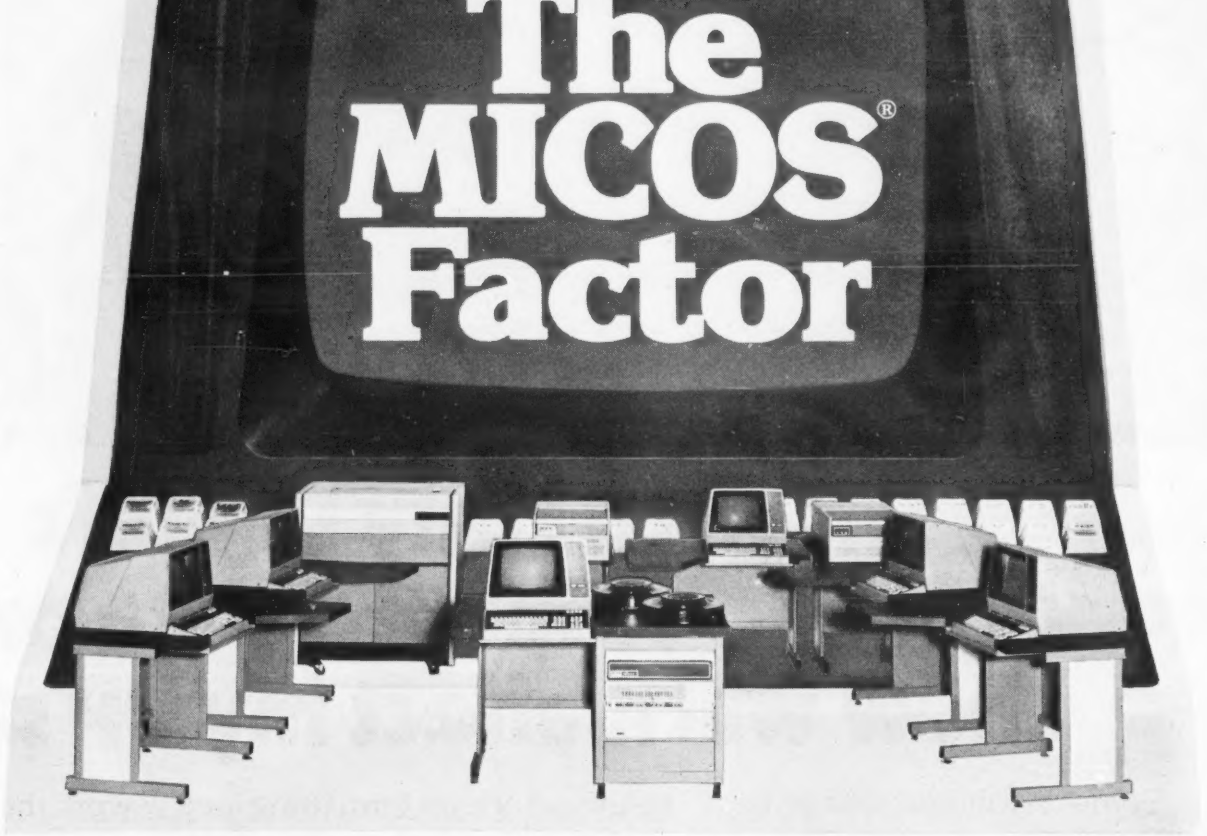

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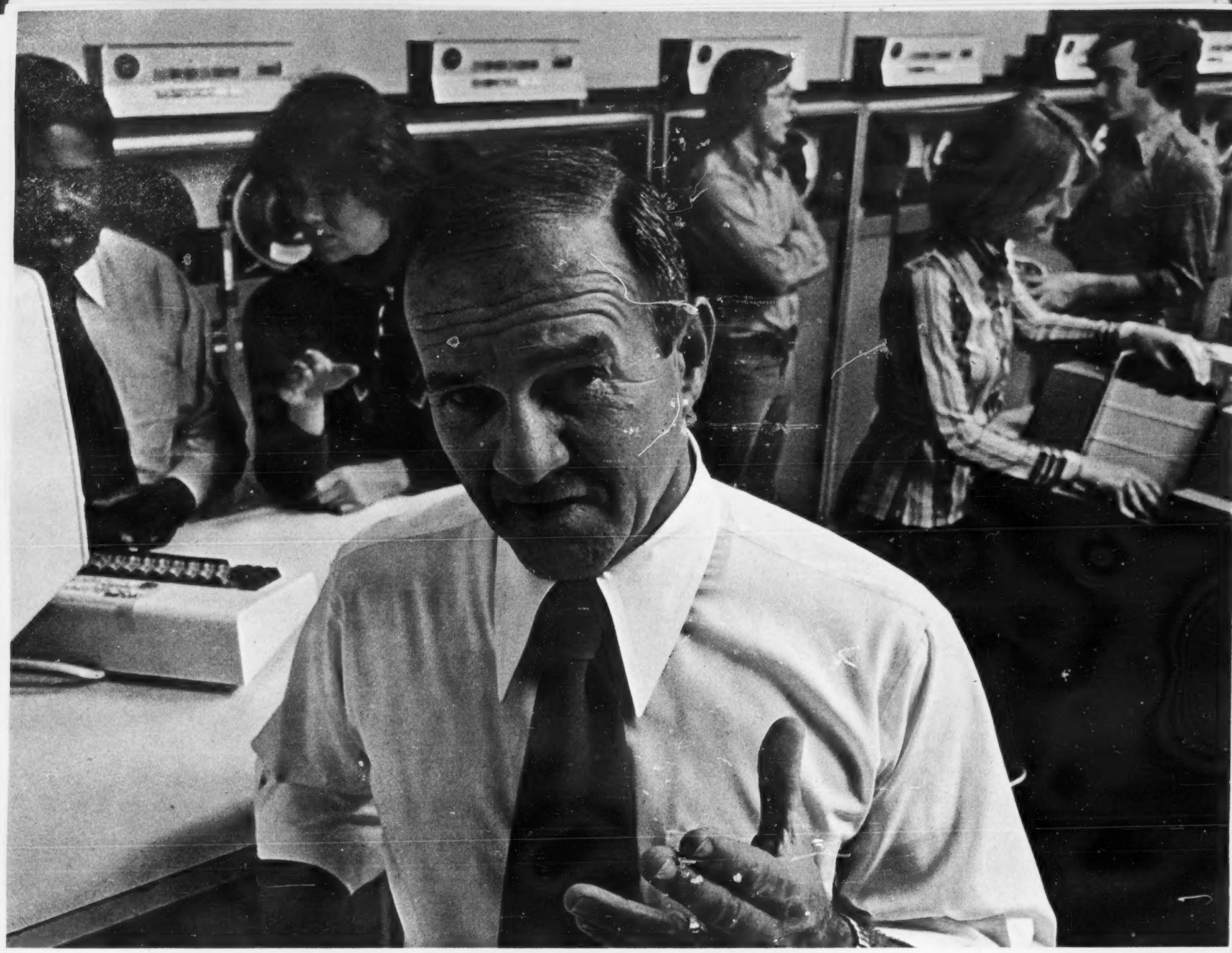

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As 1977 Ends

Users Confront Myriad of Alternatives

By Esther Surden
CW Staff

During 1977, a myriad of product introductions confronted the user and prospective user of both minicomputers and small business systems. Vendors presented numerous alternatives to catch the user's eye, but also succeeded in presenting an increasingly confusing picture.

This year, like many others, witnessed technological progress, but "people-oriented" problems still remained to plague users. Many were dissatisfied with maintenance and software support provided by their manufacturers, citing the traditional problems of software bugs that crash a system, unreliable hardware and poor documentation as major concerns.

For small business system users, the highlight of the year had to be the introduction of IBM's System 34 in April. The 34, IBM's solid entry into the transaction processing, on-line small business system arena, was not to be available to users until January 1978. The mainframer's offering reinforced what small business system users knew all along — they need today's information today.

After the product was introduced, it faced criticism about its limited capabilities and some vendors of small business systems felt secure that their users had a more capable system.

Then, later in the year, IBM increased the storage capacity and number of remote terminals that could be attached to the forthcoming system, correcting some of its major weaknesses and offering users a very strong contender for their consideration.

With the System 34, IBM also followed up on its policy of unbundling, a first move in the very small systems area for the firm, with much of the operating software priced separately. In most small systems, operating software is bundled into the price of the system since without it the system is unusable. Later in the year, NCR Corp. followed suit with its unbundled small systems introduction, the I-8100 series.

Users of the larger IBM 3/15 got increased storage — to 512K bytes — and enhanced communications capability as the mainframer also upgraded this line. In addition, it continued to add capabilities to its Series/1 19-in. rack-mounted mini.

32-Bit-Word Machines

For users of minicomputers, another highlight of the year was Digital Equipment Corp.'s entry into the 32-bit word minicomputer arena, which gave users an upgrade path from its high-end 11/70 and presented more processing power in a minicomputer-sized machine.

Joining other 32-bit-word processors, the VAX-11/780 is a hybrid system with not all data paths 32-bits wide. Signaling a trend toward very powerful superminis with 32-bit words, the DEC VAX system only runs a version of Fortran that takes advantage of the 32-bit architecture. All other languages run in 16-bit emulation mode.

Another vendor provided a system with a 32-bit word this year.

(Continued on Page 30)

DG Ups CS/40 Disk Capacity

WESTBORO, Mass. — Data General Corp. has increased the amount of disk storage available on its CS/40 small business system to 760M bytes with the introduction of two additional models.

The models — CS/40-C4 and CS/40-C6 — can accommodate from one to four 96M- or 190M-byte DG disk storage subsystems. They are also configured with magnetic tape drives for file backup, a spokesman explained.

The two models increase almost 20 times the amount of disk storage accommodated by the CS/40 system, a spokesman claimed. The models are designed for users who need very large file capacities or who must keep a large number of smaller files on-line, he added.

Already-installed CS/40 systems can be upgraded to the C4 and C6 in the field with the addition of an upgrade kit. The kits vary in price, but to upgrade from a C5 without magnetic tape to a C6 with a 96M-byte disk would cost $42,850. The upgrade kit includes all necessary hardware, a magnetic tape subsystem, the disk, an expansion chassis and a two-bay cabinet, the spokesman continued.

With an addition of communications options, the CS/40 models introduced can communicate with other DG or IBM systems, the firm noted.

All models use DG's interactive Cobol language.

A C4 with one 96M-byte disk storage subsystem, four CRTs, one magnetic tape drive and a 300 line/min printer costs $79,060. The C6 with two 190M-byte disk subsystems, magnetic tape, eight CRTs, one 60 char./-sec printer, a 300 line/min printing terminal, remote job entry communications capability and a synchronous line interface costs $138,845. DG is located in Westboro, Mass.

DEC PDP-11/34 Gets Cache Memory Option

MAYNARD, Mass. — A cache memory option will be available soon to users of the Digital Equipment Corp. PDP-11/34 minicomputer, according to the vendor.

Called the KK11-A, the cache memory consists of a 1K-word random-access memory mounted on a single full-width board. The cache reportedly has an 86% hit rate, permitting an increase in processor performance of up to 60% over the 11/34 processors without cache.

The increase in performance brings the high end of the 11/34 into the low end range of the 11/45 and 11/60, the firm admitted.

Users can have their systems upgraded to the option in the field; one board is simply plugged into the backplane of the system. No software changes are necessary to take advantage of the increased performance, a DEC spokesman said.

A high-speed data path used with the system's floating-point processor serves as the interface between the cache and the CPU, DEC explained. The floating-point processor option can be used with cache without degrading the performance of either option, the company claimed.

A processor with factory-installed cache, called the PDP-11/34C, will also be available.

Priced at $3,900, the KK11-A will be ready for installation in June 1978 while the 11/34C, also available in June, costs $18,900. DEC is in Maynard, Mass. 01754.

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Demand for System Flexibility Seen Growing

By Esther Surden
CW Staff

ANAHEIM, Calif. — System reliability and flexibility are buzz words that clearly mean different things to different people.

That much was evident at a recent conference here as several users, vendors and a consultant addressed the topic of reliability and flexibility in future systems.

Flexibility in operations was the main reason New York's Citibank turned to minicomputers, according to Victor Krasan of the institution's Technical Communications Department.

The bank, which has been in the forefront of distributing processing power to users, ultimately wants to reduce DP operations to "one workstation, so that one clerk will handle one customer" and be responsible for all the activities of that customer.

Formerly, Krasan explained, many functions at Citibank were performed in an assembly-line fashion so the chances were that the customer with a problem would never find out which person or step along the way was causing that problem.

Achieving its ultimate goal may be more difficult than the bank originally anticipated, he continued, because although the technology to handle the applications in a single system is available, training an individual to learn all banking processes may be impossible.

At Citibank, reducing paper work has increased the institution's reliability, he indicated.

The Missouri Pacific Railroad Mopac is another large user of minis whose distributed network has attracted much attention.

The railroad is very concerned about equipment reliability because when a system goes down, the operations of a yard can be stopped and it can take a day before operation is back to normal, according to John Brennan of Mopac. Equipment reliability is important because some of the units are put in out-of-the-way places.

"We use receive-only printers in printer shanties," he explained. The printers, located out of the middle of nowhere, print out work orders for work crews. "We usually don't know if they are down until after the work crew has been there," he added.

According to Brennan, Mopac would like to see more diagnostics available so that a malfunctioning printer could send a message back to a minicomputer to alert management that the printer isn't working.

Admitting that the conditions these printers have to withstand are unusual, Brennan pointed out that they should be designed to withstand nonair-conditioned environments and places subject to vibration.

Reliability of Peripherals

Taking the vendor's point of view, Ralph Gabai, corporate vice-president of Pertec Computer Corp., said that systems — and especially peripherals — will have to become more reliable and flexible. Because of the labor-intensive nature of business, downtime will have to be lessened because "we can better afford to have computers waiting for people than people waiting for computers," he said.

With LSI and microprocessor circuitry, manufacturers will have more tools to make peripherals more reliable. Improved reliability can be attributed to the elimination of weak points in a system through the use of fewer connectors, and the peripherals can be programmed to perform error detection and self-correction, he continued.

In disk drives, functions such as error correction and track reassignment will be programmed into the system to compensate for media defects, he predicted.

Systems will also be more flexible, because the host of interfaces available with minicomputers will become one unit, microprogrammable to the various mini specifications. Plug compatibility then will become a "matter of programming within the peripheral," Gabai said.

Representing another vendor, Vernon Smith of Microdata gave the traditional definition of reliability that "the mean time between failure [MTBF] of individual components determines the MTBF of the system."

But that is too simplistic a view for a number of reasons, he indicated. For one thing, the system may not fail each time a component fails and not all failures to perform are the result of hardware component failures. Factors such as noise, marginal components getting ready to fail and power fluctuations can cause failures, he noted.

Users can help improve system reliability by providing a clean environment for their expensive computing sytsems,

(Continued on Page 31)

Users' Alternatives Grow Throughout '77

(Continued from Page 29)

The top-of-the-line superminis from Wang Laboratories, Inc. have the larger word length as well as virtual memory capability.

Top-of-the-line announcements demonstrated a trend toward vendors providing systems into which their users can grow. For example, Prime Computer, Inc. introduced the 500, while Interdata announced the 8/16 to fill out its 16-bit line. Systems Engineering Laboratories added the 32/75 for high-speed computational applications.

Datapoint Corp. came up with the 6600, General Automation, Inc. unveiled its 16/550 dual-processor system and Four-Phase Systems, Inc. unwrapped the IV/90. All of these products seemed to put increasing importance on preserving the user's software investment.

First-time users and those upgrading from accounting machines received a good deal of attention from manufacturers trying to sell their wares. Companies like NCR and Basic/Four Corp. offered systems that users could not program, limiting user options, but also cutting costs. Firms like Qantel Corp. and Basic/Four spoke of parameterized software that could be easily adjusted to a user's needs.

For First-Time Users

First-time users were wooed by an array of equipment so varied that not even the vendors could tell the difference without a scoreboard. Whole minicomputers were contained in single workstations or CRTs and desktop units abounded.

New lines of small business systems were unveiled, such as Univac's BC/7 and Data General Corp.'s CS/40, further adding to the confusion. And almost every small business system that came out was designed not just for first-time users but to fit into remote offices operated by those Fortune 5000 firms as distributed processing continued to become less of a buzzword and more of a reality.

This year showed growth in the mass storage area as well; at least two vendors came out with bulk core storage modules. Described as a replacement for fixed-head disk, the core storage modules presented a different alternative for users with large data base or swapping requirements.

Charge-coupled device (CCD) memories were also made available for end users this year with at least one maker bringing out a CCD-based system that directly interfaced to various popular minicomputers.

Older product lines were also enhanced this year. DEC added three new models to its PDP-8 line and increased memory to 128K. Companies like Texas Instruments took their barebones minis and configured them for commercial users.

Surely not all vendors who followed or initiated trends this year could be named in so short an article, but all of the products introduced this year combine to create a collage of systems suited to almost any user's needs. But if by chance this year's offerings don't fit your requirements, there's always next year. . . .

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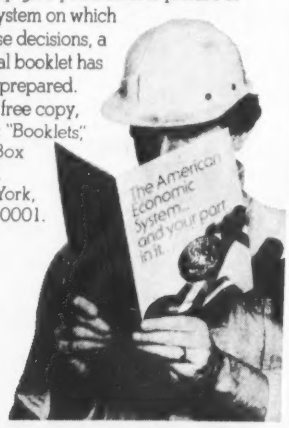

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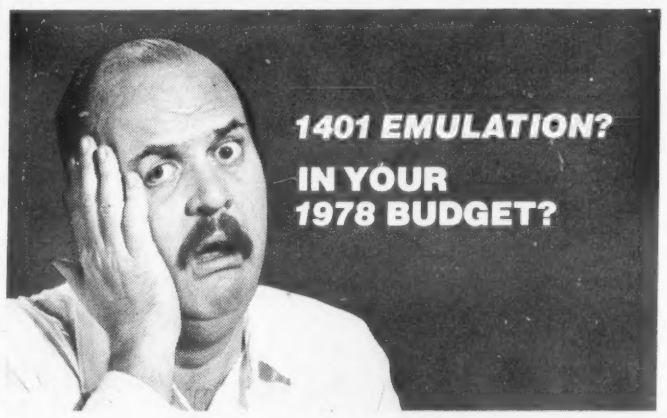

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DDP Seen Easing Department Managers' Jobs

By Esther Surden
CW Staff

ANAHEIM, Calif. — "Distributed processing is a technology that — although very old in theory — is just becoming practical due to advances in hardware technology," Roger E. Billings, president of Billings Computer Corp., told a group at a recent conference here.

Although it is an idea whose time has come, distributed data processing (DDP) is encountering some opposition, he pointed out. Some long-established DPers are well set in the direction that worked for them last year, he explained.

Describing one analysis his company did of a Fortune 500 company that has an IBM 370 mainframe, Billings said many gains can be made with DDP. For one, the management of various departments can have a better knowledge of what goes on in their departments.

In this particular case, the managers of the departments have run their areas "almost as a small business." DDP will help improve that operation, he said.

As part of the analysis, the managers were asked to show the consultants what parts of the printouts prepared by the large system were most valuable to them. The results of this exercise showed that the managers did not understand the printouts and in many cases didn't understand the accounting manipulations that produced the various numbers on the printouts.

Photos by E. Surden
Roger E. Billings

The managers were also asked what numbers they would like to see on the printouts, but the analysts found the information the managers most wanted was already available to them, although not in an easily accessible form. DDP can make information easier to get, he indicated.

To overcome fear of the system, the company let each manager learn how to run a simple conversational program. "They all became excited," he said, at the system's possibilities.

Although the system is not yet implemented at the company, when it is the firm expects several benefits to take place as a result of DDP. "The department managers will find out what's going on in their departments," Billings said.

In addition, the system will probably eliminate 250 employees now employed in either card input functions or not adequately producing for the firm.

Users Told Not to Underestimate Cost of Installing Small Machines

By a CW Staff Writer

ANAHEIM, Calif. — When it comes to costs, putting in a minicomputer is just like putting in a mainframe: "You have to do your homework," John M. Weir, president of Accounting Datamation, Inc. told a session at a recent conference here.

Installation costs are important because they often exceed hardware costs, he cautioned about 200 attendees at a session on the criteria used in selecting and evaluating a minicomputer.

The installation includes the planning and system design phase, the programming of the system to meet the objectives outlined in the planning phase, implementation of the system and both hardware and software maintenance.

One of the most important cost-cutting hints an organization installing a system can follow is to make a plan and stick with it, Weir said. Following a plan requires the involvement of the people in the firm where work habits are to change because of the system, such changes should be anticipated, he said.

The most important change that will take place when the mini is installed will be the increased efficiency of management, he added.

'Pay as You Go'

In order to follow a plan, the organization should be aware of the areas that need to be automated. Some applications may be of marginal value to the business, he told the group.

The best way to make sure a system is cost-justified is to adopt a "pay-as-you-go" program of savings, he said.

Management should be heavily involved in the study of which system to choose and the implementation plan, he noted. All the design work should not be left to others; if management is to make the final decisions, there is "no substitute for you in management of the business to get involved."

System design should be undertaken by the people who know why an application should be performed a certain way. Final responsibility for how an application is run should lie with its user, who should sign off on a description of what work is wanted, he recommended.

Programming of the system can be done by an in-house programmer, software consultant or by the vendor who sold the system. If the user chooses to go to a person outside his organization to write the programs, he should look for someone who is familiar with his business.

The user should go visit an installation, Weir advised. Even if that particular installation is not doing exactly what the user wants to do, "you'll come out of the place with good ideas," Weir said.

Demand for Flexibility Growing

(Continued from Page 30)

he said, and by keeping temperatures steady within given ranges.

In addition, operators should be trained in handling disks and tapes, he advised.

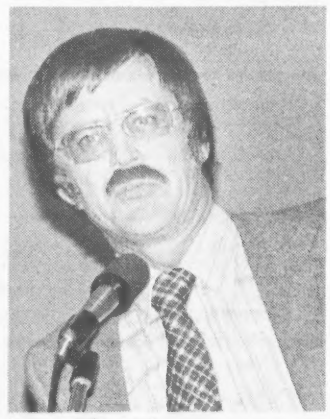
To an end user, reliability means having access to the system when needed, Smith pointed out, so this requires a system whose data base is protected against loss if system failure should occur. Manufacturers, he noted, must make a trade-off between cost and reliability. If too much reliability is built in, the system can be overpriced while "too little will also get a manufacturer in deep trouble."

It is possible, Smith asserted, to have negligible downtime in the face of a nonnegligible failure.

With tongue in cheek, Thor Thorenson, a consultant with Advanced Computer Techniques, said that flexibility is like rope — the more you have, the easier it is to hang yourself.

Flexibility means a system can accommodate a wide range of user environments and arrangements and the user is free to configure equipment to meet his needs, he continued, noting that for users to be able to configure systems in any way they please, interfacing will have to be standardized.

"To unite manufacturers on this issue will probably be easier than getting a settlement in the Middle East," he continued.



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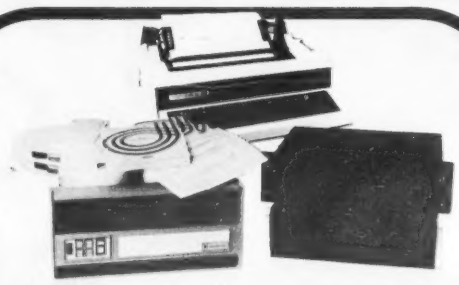

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Rapid Advances Predicted in Mini Storage Area

By Esther Surden
CW Staff

ANAHEIM, Calif. — A tape drive with 15,000 bit/in. density and vacuum buffering, auto-loaded with speeds up to 250 in./sec; floppies interfaced for under $500; nonremovable 300M- to 500M-byte drives at prices 30% less than today's removable 100M-byte drives; and bubble memory emulators of 10M-byte drives — all are in store for users, according to a paper presented at a recent conference here.

Randy Knapp, president of Western Peripherals, Inc. maintained that "one has only to glance through IBM's or Univac's or Burroughs' latest catalog to see what's coming for the mini/micro field."

Magnetic tape is still around despite its predicted demise in the early 1970s, he said. "Its low media cost and almost universally accepted formats leading to informational interchange between all mainframes" have allowed it to hold its own, he indicated.

During the past year, about three different manufacturers introduced 6250 rack-mountable drives and several also introduced 125 in./sec drives "of the more common 1,600/800 bit/in. type," he said. Another innovation was a 45 in./sec tension arm drive, while still another development was the redesign of low-speed 7-in. and 8-in. units by another manufacturer.

Users are attracted to mag tape because a 2,400-ft roll of tape can hold from 20M bytes to 40M bytes of storage for less than $20, he pointed out.

In addition, a local IBM, CDC Burroughs or Honeywell service bureau can read the tapes. Tape also takes up about a third of the space of a cartridge disk and "tape heads don't crash," he said.

"I think mag tape is here to stay for at least the next 10 years, although its place in the market will continue to grow at a decreasing rate." The tape people, he predicted, will still have "a few aces up their sleeves" such as speeds to 250 in./sec and densities of up to 15,000 bit/in.

Floppies' Future

Whether or not floppies will continue to be "the darlings of the industry" will depend on who buys microcomputers. The picture of microcomputers and floppies being "catapulted" into homes of the future may or may not come true, he indicated.

The area of head-per-track units has stayed stable with "one exception" — bulk core memory emulators of disk systems. This application could be extended to bubble memories, he said.

Cartridge disks are showing a "slow shift upwards in density" to 4,400 bit/in. and are now available with 40M bytes of storage.

Tektronix 4051 Has File Manager

BEAVERTON, Ore. — Tektronix, Inc. has a flexible-disk, mass-storage device designed to give its 4051 graphic system random-access file management capability.

Using double-density recording, the 4907 file manager provides up to 1.89M bytes of user-available storage in the triple disk drive configuration, the firm said.

Variety of Configurations

The 4907 is available in single, double and triple disk drive configurations. The single disk drive is contained in a single cabinet; a second cabinet is required for the double-or triple-drive configurations, Tektronix added.

Base U.S. price for the single-drive, 630K-byte configuration is $3,900. Tektronix can be reached at P.O. Box 500, Beaverton, Ore. 97077.

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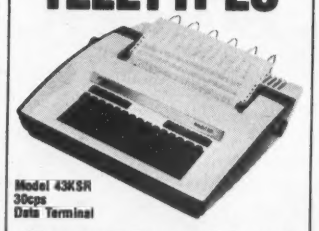

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Hobby Micro Comes of Age in 1977

By Frank Vaughan
CW Staff

Someday, historians may look back on 1977 and decide 1977 was the year when the hobby microcomputer came of age.

Certainly, the micro saw some use before 1977, but it was never paraded before the public in such a grand style as it was this past year. This was truly the year of the micro show.

The historian who looks back on 1977 will most certainly feel the first of the microcomputing shows took place on the national level, beginning with the First West Coast Computing Faire. Other significant shows during the course of the year took place in Atlantic City, Boston, New York and Chicago.

Wild West Show

As with all emerging ideas, the microcomputing scene seemed like part of a Wild West show during the past year. Foolish claims concerning shows were met with even more foolish rebuttals, and observers from the more "established" areas could only shake their heads and mutter that "they'll get over it ... someday."

One thing about 1977 the historians are certain to note with dismay is that this was not the year of the user. In many cases, it was the year for everyone but the user.

" ... this was not the year of the user. In many cases, it was the year for everyone but the user."

What made it that way? For one thing, the very nature of the industry, with firms introducing nonexistent products, hoping to sell enough of the idea to actually be able to manufacture the product.

Unbelievable lags in delivery times and, in many cases, an unfortunate tendency to ignore user complaints of nondelivery, nonexistent documentation and unobtainable performance claims also contributed to the user's mayhem.

But the hobbyist is still pushing to the front of the booths, checkbook in hand, hoping to buy the ultimate system for the least amount of money. The reasons for this? Certainly the major products that have been announced for the hobbyist this year can be given credit for sparking more and more of the interest in the hobby.

Among the major products making their debut were Radio Shack's TRS-80, Heath Co.'s H-8 and H-11 and Commodore's PET. These products helped change microcomputing's reputation, from being the elite hobby of electronics and ham radio enthusiasts to a hobby which a nontechnical person can enjoy.

The increased interest in microcomputing as a hobby spawned several hundred hobby clubs throughout the country, several boasting membership in the hundreds. The clubs played an important part in the development of microcomputing as a hobby and began to play a role in developing user "clout" with the vendors.

In addition, many of the clubs began subdividing into special interest groups or user groups for each of the major microprocessors, aiding in the develoment of software and diagnostics.

This growing user clout was especially evident in the area of programmable calculators, where users were able to develop capabilities unknown to the manufacturers ... and the vendors responded by coordinating activities with some of the user groups.

What else was 1977? It may have been a lot of different things to a lot of different people, but most of all it was the year when the micro came of age for the user — and the user began to exercise some control over the way the hobby shaped up.

Static Memory Modules Introduced for PCM-12

SAN RAMON, Calif. — Three static memory modules have been introduced by Pacific Cyber/Metrix, Inc. for use with its PCM-12, a 6100 microprocessor-based, 12-bit microcomputer system.

The first, the 12020A, is a 4K-word by 12-bit memory element that constitutes one full field of memory. Each board reportedly carries 59 integrated circuits, of which 48 are low-power, 1K static memory devices, and all the necessary bus interfacing logic.

This unit costs $289 assembled and $199 in kit form.

The 12160 holds 1.5K 12-bit words of read-only memory in the highest pages of its field and, in its lowest pages, 512 12-bit words on n-channel random access memory (RAM).

With a memory extender module, the 12160 can be used in any 4K field of memory in the PCM-12, the vendor said. It costs $455 assembled and $385 in a kit.

The 12210 is a nonvolatile memory organized as 4K, 12-bit words. It is comprised of 48 1K CMOS RAMs with an automatic battery backup that retains the contents of its memory up to 30 days when the system power is turned off, the firm claimed.

The unit also contains all the TTL necessary to interface it with the PCM-12's system bus. This memory module is priced at $580 assembled and $490 in kit form.

Pacific Cyber/Metrix is at 3120 Crow Canyon Road, San Ramon, Calif. 94583.

SC/MP II Gains Development System

SANTA CLARA, Calif. — National Semiconductor Corp. has introduced the Low-Cost Development System (LCDS), intended for use in hardware and software development, for its SC/MP II microprocessor.

The SC/MP and SC/MP II microprocessors are object-code compatible, both having built-in multiprocessor capability.

The firm regards the SC/MP II as a faster, lower power n-channel upgrade of the original p-channel MOS SC/-MP, running twice as fast and requiring less than 200 mW of power.

Existing user hardware can be channeled into the LCDS and programs not exceeeding a certain level of complexity can be entered in hexidecimal and executed from any point in memory, National Semi said.

Instructions, memory data, control values and contents of various registers can be displayed and modified. Programs can be single-instruction stepped, executed at speed or executed in sections broken by dynamically inserted halt instructions, a spokesman added.

The firm is currently working on an SC/MP "In-Circuit Emulator" card and a bipolar programmable read-only memory (Prom) programmer card for the LCDS to be available by the end of the year.

The LCDS is priced at about $500 from National Semi at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Book Details Basic Games

ROCHELLE PARK, N.J. — A collection of games and puzzles that have been written in Basic has been published by the Hayden Book Co.

Game Playing With Basic, written by Donald D. Spencer, contains over 60 computer games and puzzles. The book is written in a nontechnical style, with information on the history and theory behind many of the games, the publisher said.

Program listings, flowcharts and diagrams are also included.

The 166-page book costs $6.95 from Hayden at 50 Essex St., Rochelle Park, N.J. 07662.

Development Units Based on Z-80

LOS ANGELES — Four product development systems that are based on the Zilog, Inc. Z-80 microprocessor unit (MPU) have been announced by Futuredata Computer Corp.

The Microsystem 12, 15, 20 and 30 include an MPU that can accommodate up to 56K with available memory modules. A 960-character CRT, Ascii keyboard, dual floppy disk or cassette tape unit and operating system software and documentation are also included with the systems.

Features include two RS-232 serial ports, an 8-bit parallel TTL I/O port, a real-time clock, a bootstrap in programmable read-only memory, a write protect feature under software control, 8-level vectored interrupts and a direct memory access (DMA) capability, the firm said.

Basic Microsystems include 16K of memory with the exception of the Model 15, which has 32K of random-access memory (RAM).

The Microsystem 15 includes a monitor/debugger and an editor and assembler in memory along with source and code workspace; it is priced at $5,275.

The Microsystem 12, which has a Microtape/2 dual cassette tape unit, costs $4,325. The Microsystem 30 comes with an 8-in. floppy disk unit and costs $7,675; the Microsystem 20, with a 5-in. mini floppy disk drive, sells for $6,475.

Additional RAM modules for the systems start at $475, Futuredata said from 11025 S. La Cienega Blvd., Los Angeles, Calif. 90045.

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CORE — Refers to tiny "doughnuts" of magnetizable metal that can be in either an on or off state and can represent either a binary 1 (on) or binary 0 (off). Commonly called magnetic core and used as the basic type of main memory for many computers.

CROM (CONTROL READ-ONLY MEMORY) — Refers to a specific ROM that has been designed and microprogrammed to decode control logic. It is a major component of several types of microprocessors.

CROSS-ASSEMBLER — 1. Refers to a program run on one computer for the purpose of translating instructions for a different computer. 2. Programs are usually assembled by the same assembler or assembly program contained within or used by the processor on which they will be run. Many microprocessor programs, however, are assembled by other computer processors whether they be standard, time-shared, mini or other microcomputers. This process is referred to as cross-assembly, and the programs are not designated for specific microprocessors but are to be used on other computers. They are known as cross-assemblers.

CURSOR — 1. Refers to various position indicators frequently employed in a display on a video terminal to indicate a character to be corrected or a position in which data is to be entered. 2. A solid underscore which may appear under any character location on the screen. In some systems the cursor always appears under the location where the next character will appear.

DAISY CHAIN — Some microprocessor manufacturers use bus lines that are interconnected with units in a manner such that the signal passes from one unit to the next in serial fashion. The architecture of the Fairchild F-8 is an example of daisy-chained memory chips. Each chip is designed to connect to its associated unit to accomplish daisy-chaining of interrupt priorities, beginning with the chip closest to the CPU.

DATA — 1. A general term that is used to denote any or all facts, numbers, letters, symbols, etc. which can be processed or produced by a computer. 2. In a more restricted sense, data refers to numerical information as contrasted with nonnumerical information. 3. Implying source data or raw data as contrasted with information which is then defined to mean the knowledge obtained by the processing of data.

DATA BUS — Most microprocessors communicate externally through the use of a data bus. Most are bidirectional, e.g., capable of transferring data to and from the CPU, storage and peripheral devices.

LEARNER'S LEXICON

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Revenues, Earnings Up for Most

Industry Experiences Boom Year in '77

By Molly Upton
CW Staff

For the computer industry, 1977 was a boom year, reminding many industry veterans of the salad days of the late 1960s.

Revenues and earnings were up for most firms and most were predicting that the good times would carry over through at least the first half of 1978.

Everyone in the mainframe business reported profitable results, led, of course, by IBM, which continued to set earnings and revenue records at a methodical pace.

At the lower end of the industry, a trend toward acquisitions which began last year proceeded at a steady pace throughout the year, with a flurry of activity coming in the last quarter.

The services firms continued to cast their nets for smaller fish, and some of those fish were not really so small. ADP fed its ever-voracious appetite with First Data Corp. and several other firms. Itel, too, was on the march.

In other areas, terminal makers of various sorts seemed to be ripe for takeovers. Incoterm, after an ill-fated attempt at a union with Data General Corp., found Honeywell Information Systems to be an acceptable suitor.

Sycor was snapped up by Northern Telecommunications, Inc., which also picked up a piece of Data 100 Corp.

And then there was Shugart — now part of the Xerox conglomerate along with Diablo. Shugart had survived some hard times when the market was slow in developing and the founders had ideas about entering other product areas.

It managed to stake itself to a sizable piece of the floppy disk pie and developed head technology that should enable it to produce for Xerox an entry in the Winchester-type market. Could it have made the bigger time alone?

These were but a very few of the multiplicity of acquisitions that happened in 1977.

Pricing Moves

On the pricing front, mainframers gave the distinct impression they were reluctant to pass cost decreases on to the consumer until the other guy made the first move.

In at least one instance, IBM was the first to make the move, and the others followed suit rather quickly. Although analysts expressed concern about the effects on the others' profit margins, no adverse effect surfaced. Perhaps there was more fat there than met the eye.

But with decreased prices on hardware, the mainframers turned to other areas. Consider, for example, the pricing on maintenance and software.

In the mini arena, Control Data Corp. continued to be very competitive with its OEM peripherals.

As happened last year, printers continued to be a field with allure, and many firms unveiled slow, medium and fast printers at the National Computer Conference in Dallas.

It had been five years since there were semiannual industrywide conferences sponsored by the American Federation of Information Processing Societies. Dallas was full to overflowing, and the 1978 show at Anaheim is not only sold out for the convention center, but also for a parking garage, which will be enclosed for the occasion. Time for two a year?

Micros, which have certainly been around on the OEM scene, emerged this year as a consumer market that more than a few began investigating.

And then there were the minis. As before, the lines between mainframe and mini and mini and micro continued to blur to the point where one wondered if the different monikers served any useful distinction.

The mini makers decided 32-bit machines weren't strictly for the scientific crowd, and the bets are on the table for which firm will effectively market a true 32-bit architecture and software designed specifically for business data processing.

F&S Sees Product Mix Changing As Communications Grows 20%

NEW YORK — While the data communications marketplace will show substantial growth over the next five years, that growth will be marked by a great deal of change in the product mix, a Frost and Sullivan, Inc. (F&S) report indicated.

The market will grow at a rate of over 20%, the market research firm said, adding, however, that "in the early '80s we expect this market to be subject to major redefinition."

Depending on that redefinition of the market, it could either grow rapidly or shrink from that point on, the firm said.

What will happen is that "data communications, and for that matter DP itself, will gradually become less of a highly specialized, sterile technical discipline, but more of a commonly accepted facet in our daily life," F&S said.

Looking at specific product areas, the report predicted "the modem market in general will remain stable with very moderate growth. But the various modem types will fare differently in the years ahead.

"Low-speed modems will lose ground to high-speed modems as technological advances permit higher speed transmission using the voice grade line, but both categories, together with medium-speed modems in between, will suffer from the increasing market share for digital transmission facilities that do not require modems."

The multiplexer market, however, "will be more interesting. While the future of the multiplexing function is not altogether bright (the function could be taken over by common carriers), multiplexers now tend to become more sophisticated and to encompass certain functions heretofore fulfilled by communications processors.

"By the same token, some limited multiplexing chores are being fulfilled by modems," the report said.

"The market for communications processors will remain a major segment of the data communications market and will continue to grow, but will be subject to redefinition. It may even be redefined away altogether," F&S said.

"Assuming we will still have a 'communications processors' product category in the mid-'80s, we predict minicomputers will take a greater role, and packaged communications processors will become more of a peripheral for the mainframe. IBM will remain in control over this market.

"It is possible that much of the communications processing functions will be either made a standard feature of the mainframe or taken over by common carriers," the report added.

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SEL Sees Established Areas Its Major Strength

By Molly Upton
CW Staff

FORT LAUDERDALE, Fla. — The upswing in Systems Engineering Laboratories, Inc.'s (SEL) order rate reflects increased demand from the firm's established market areas rather than the recent excitement about 32-bit machines, according to Sam Bosch, director of product marketing.

The firm expects to earn over $4 million while increasing shipments to more than $50 million during the year ending June 30 compared with shipments of $31 million last year, he said.

SEL's principal marketing thrust is to OEMs supplying equipment for simulation, scientific computation, energy management and data acquisition, he said. The firm also intends to focus on improving productivity, he added.

Although the government was once SEL's predominant customer, sales to the government now account for 50% of the firm's business.

"Simulation has caught the fancy of people for no matter how expensive a simulation system, it is cheaper than" testing to destruction, Bosch observed.

SEL machines are used to simulate power plant operations, and space shuttle and aircraft flights, for example, he said.

The value of the average SEL unit is more than $120,000, he said. SEL provides its OEMs with systems level capabilities such as CPU, memory, disk, tapes and peripheral controllers.

Software includes Fortran IV, a real-time monitor, program development executive and terminal support subsystem, he explained.

The firm plans to offer some capabilities for multiuser functions, but is not chasing the general business DP market, he added.

Demand for 32-Bit Machines

One reason for the rise in demand for 32-bit minis is the decreasing difference in price between them and 16-bit machines, he indicated. The cost differential once was 50% to 100% more but is now between 10% and 20%. None of the major vendors got into the 32-bit field as they were booming with 16 bits, he added.

Commenting on Digital Equipment Corp.'s entry into the field, he said, "I'm not really tickled pink. In the long term we'll be competing with them, but for a couple of years they'll protect their 16-bit base and also will be selling to their current base."

SEL has the fastest I/O bus on the market — 26M byte/sec vs. DEC's 13M byte/sec, he added.

The firm has increased its production rate from four CPUs per week to eight and plans to be turning out 10 per week by June, he said.

Whereas a year and a half ago the firm had about 500 employees, it now has over 900, he said. SEL runs a second shift and next year will obtain 40,000 sq ft of office space so it can increase its production area. Currently the firm has around 150,000 sq ft.

In addition, the firm is "investigating the addition of a facility in Puerto Rico."

SEL has offices in 18 cities in the U.S. and 12 international sites through subsidiaries.

At the firm's annual meeting, President Asa Randolph unveiled the $40 millon projection but observed that as of the end of October, the firm's backlog was $34.5 million of which $32 million worth — 132 computers — must be shipped by June.

SEL was quoting delivery times of 150 to 180 days and is attempting to reduce that to 90-120 days.

The first-quarter earnings rose 461% to $875,000 from $156,000 in the same period the previous year on a 63% rise in revenues to $9.8 million from $6 million.

Randolph said the firm is converting from wire wrap technology to etched printed circuits throughout the 32 series line, which should expedite production and improve reliability.

The last big year SEL posted was fiscal 1970, when it showed $1.8 million in earnings on $20 million in revenues.

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Canadian Firm Acquires Sycor, 12% of Data 100

MONTREAL — Northern Telecom Ltd. here went on a buying spree south of the border, agreeing recently to purchase Sycor, Inc. and pick up a 12% interest in Data 100 Corp.

Northern, with revenues of $1.1 billion (Canadian) in 1976, is the largest manufacturer of communications equipment in Canada and second only to Bell in North America.

Under the deal with Sycor, the firm would pick up all the Sycor stock at a rate of .9 share of Northern for each Sycor share with a minimum value of $22 per Sycor share. The agreement must be approved by Sycor shareholders and the boards of each firm.

The 12% purchase of Data 100 stock is part of an agreement between the two firms that will permit Northern to eventually purchase up to 35% of Data 100. The price for the one million shares of Data 100 stock was set at $15 per share; Northern has the option to pick up another one million shares by the end of 1978.

In addition, Northern will invest $5 million in a joint research and development effort with Data 100, the firms said.

Aggressive Program Planned

Varian Gives Univac New Market

By Esther Surden
CW Staff

IRVINE, Calif. — When Univac acquired Varian Data Machines last spring, it continued the trend of mainframers moving into the lucrative minicomputer business.

Joining IBM and Honeywell, which now manufacture their own mini systems, Univac acquired the company to "attack a market it was not in before." This market consists of users who need systems that fall beneath the firm's BC/7 small business system and its somewhat larger 90 series, according to Jerome J. Meyer, vice-president and general manager of Univac Minicomputer operations.

The move to minis has given the firm the ability "to capture those buyers who normally buy products out of that sector," he explained, as well as the opportunity to protect the low end of the Univac line from erosion by other vendors.

Is Univac going to stay in the mini business? "Our strategy is not to buy out our competition," Meyer answered.

Although the division is still in a state of transition, ambitious plans to beef up operations are already under way. Estimating the minicomputer industry's growth rate at 40% per year, Meyer said "we have to beat that growth."

Univac will continue to serve the two market areas already developed by the Varian organization. As Meyer explained, the Varian systems were used by scientific users in high technology industries or incorporated into specialized systems such as numerical control units. Just prior to the Univac takeover, the firm had taken a step into the commercial end-user marketplace.

"We are trying to get a balance" between the scientific and commercial marketplace, he said.

Announcements Planned

Univac plans an aggressive program in product announcements over the next year. New products will be coming out at a fairly frequent rate, Meyer said.

Hinting that at least some of these announcements will be products designed to work with larger Univac systems in distributed data processing applications, Meyer added the firm also "has a lot of people looking at the embedded mini" that is, using the systems as componenets.

Univac, having acquired a mini manufacturer, "intends to exploit it to the maximum."

When Univac took over Varian, "we kept it intact except for two areas," Meyer continued. The small Varian operation in Europe was moved to Univac International, and the customer engineers were moved into the larger Univac customer engineering group.

Cross-Training Underway

All customer engineers are in the process of being cross-trained on all the equipment, he said. Before, "there were cities where Varian just couldn't make a sale" because service was so far away, he stated.

Presently the hottest selling item in the Univac product line is its V600 system, "but that may be because that's what we are asking our people to sell," Meyer noted.

Minis for Lease?

Although there is a dedicated sales force for the minicomputer product line, the system is also available through the regular Univac catalog. The Minicomputer Operations Division is also eyeing the possibility of leasing the minicomputer equipment.

Part of the reason no such plan has been released is that the firm expects an upsurge in business when the minis are available on lease, he indicated. This might tax the company's present capacity, he noted, since it has not achieved the industry-standard 90-day delivery rate for its systems. It is working on the problem, he said.

CW Photo by E. Surden
Jerome J. Meyer

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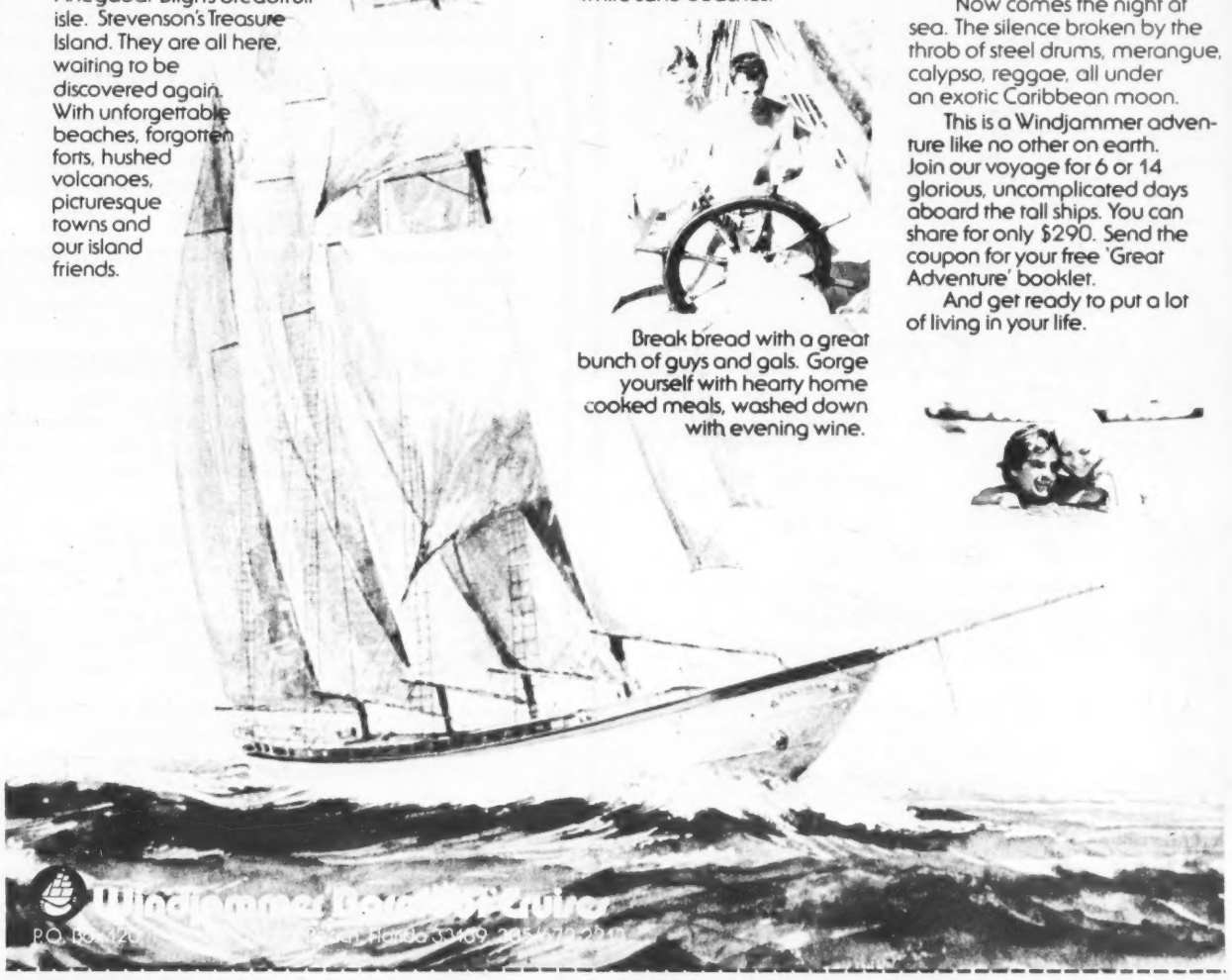

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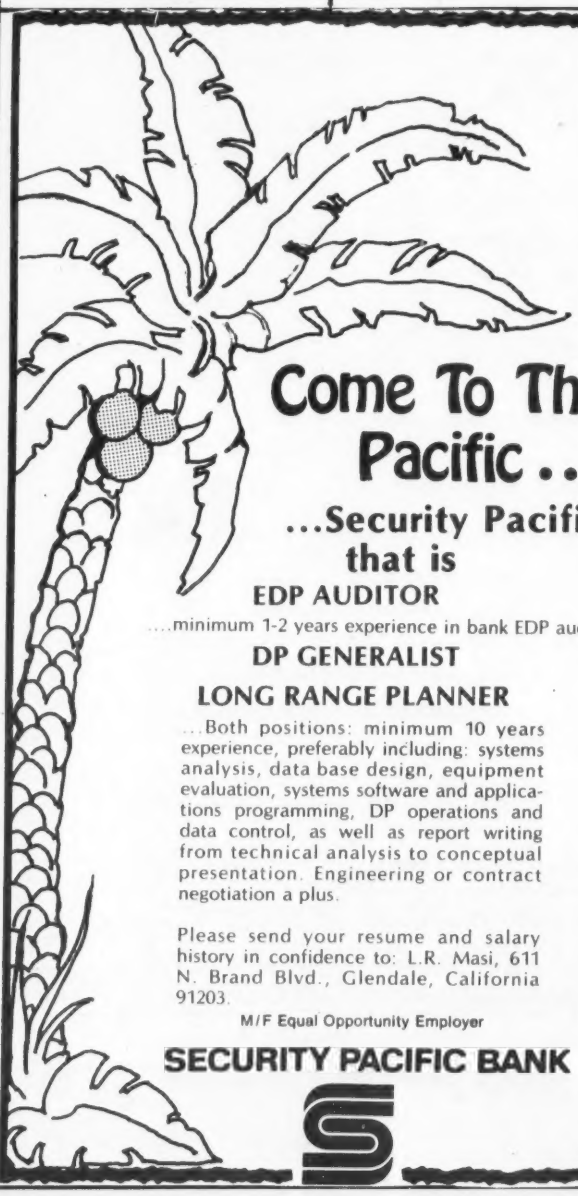

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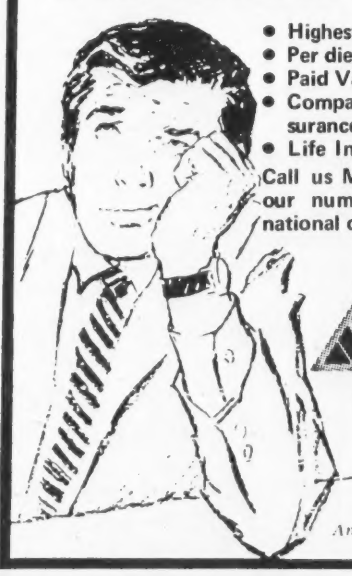

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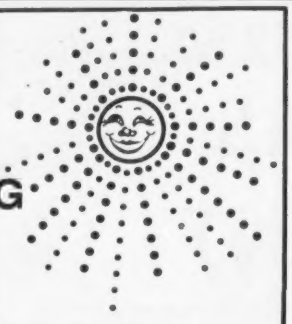

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Join us and you'll discover a highly progressive environment oriented towards the needs of the technical professional, as well as an excellent salary, benefits and expense package that reflects your standing as a professional. For confidential consideration, forward a letter or resume including salary requirements and earnings history to WANG LABORATORIES, 444 N. Michigan Ave, Chicago, IL 60611.

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SYSTEMS PROGRAMMER

Progressive organization seeks an individual to join a group of professionals dedicated to quality results. The ideal candidate should possess proven experience in DOS VS and CICS VS systems programming.

SYSTEMS ANALYST

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Senior and intermediate positions are open. For our senior positions we seek applicants who have held key positions in system design, application programming and/or systems programming on comparable configuration. Two years programming experience or its equivalent is necessary for intermediate level positions. Starting salary ranges from $14,800 to $21,000+. Excellent benefits, 4 weeks vacation. Send resume to: OCA-CPS, Rm. 1108, 270 Broadway, NYC 10007.

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We are seeking an individual to manage data entry, computer operations, and distribution at a facility which services seven divisions of Cessna Aircraft Company.

This position reports directly to the manager of data processing and includes supervisory responsibility for two exempt and approximately sixty non-exempt employees.

Prior supervisory experience in operations is required. Operations experience in an IBM 370-158 environment operating OS/VS1 is also a requirement.

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Employment Manager
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SYSTEMS/ PROGRAMMER

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Contact D. Pellerin
collect at
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Salary dependent upon qualifications and experience, and other benefits will be competitive. Applications should be received by March 1, 1978.

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Send resume to:
Dr. Mok Tokko, Chairman
Computer Science Dept.
University of North Dakota
Box 8181, University Station
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SYSTEMS ANALYST

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PROGRAMMERS AND SYSTEMS ANALYSTS

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SYSTEMS

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PROGRAMMER ANALYST

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PROGRAMMERS

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428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

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303 Sacramento Street
San Francisco, California 94111

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CFA Associates Personnel, Inc (Agency)
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In addition we offer a liberal salary that is commensurate with your experience, a comprehensive benefits package and many outstanding opportunities for both professional achievement and personal growth within our organization.

WRITE IN CONFIDENCE TO:

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David R. Sier
A-3 Government Center
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•SYSTEMS PROGRAMMER •APPLICATION PROGRAMMER/ANALYSTS

Our data processing organization offers a professional environment and is flexible to the individual talents of its staff. If you are seeking an opportunity where your total experience can be utilized in a state-of-the-art shop ... read on!

CURRENT ENVIRONMENT:

Presently our dual operating consists of IBM 370/158 2 MEG; 370/145 1 MEG with the new IBM 3032 on order under OS. Peripherals include 3420's, 3330's, 3350's, 3211 and 1403. Our operating system is VS-1 with a large nationwide telecommunications on-line network.

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This outstanding opportunity is perfect for a progressive individual who wishes to exercise full range of systems programming skills. No chance to get weighed down in only one area of responsibility. We are small enough for an individual to be thoroughly challenged and recognized yet large enough to provide opportunities for advancement.

To qualify you must possess experience in the following areas: assembly language coding, SYSGEN-VS-1 or SVS, VS-1 or SVS internal, and JCL. Additional experience in interactive, time-sharing, performance measurement and evaluation, and hardware and software evaluation is a definite plus.

APPLICATION PROGRAMMER/ANALYSTS

We have immediate needs for individuals who enjoy to participate on projects from the ground floor up, analyze the needs of the user, investigate options, and complete the program. Qualifications include a strong COBOL background (1-3 years) in a manufacturing environment under OS/VS-1. JCL knowledge essential. Formal education in data processing plus assembly language coding desirable but not necessary.

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Resume's must be in by January, 1978
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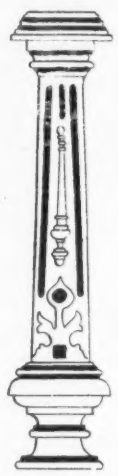

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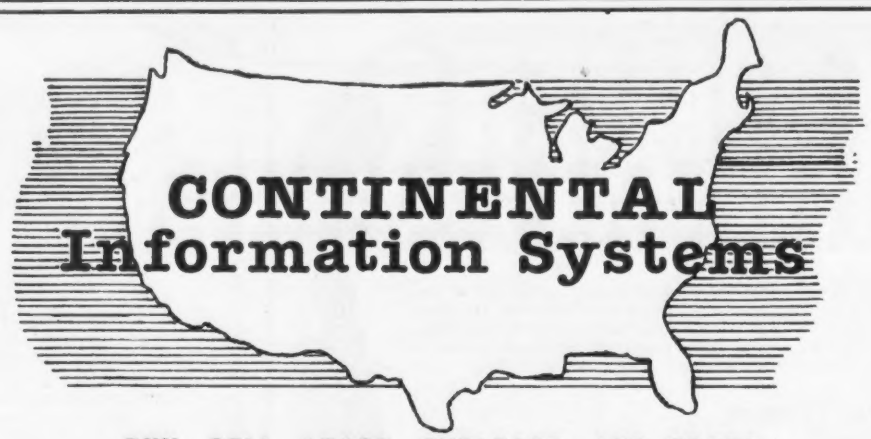

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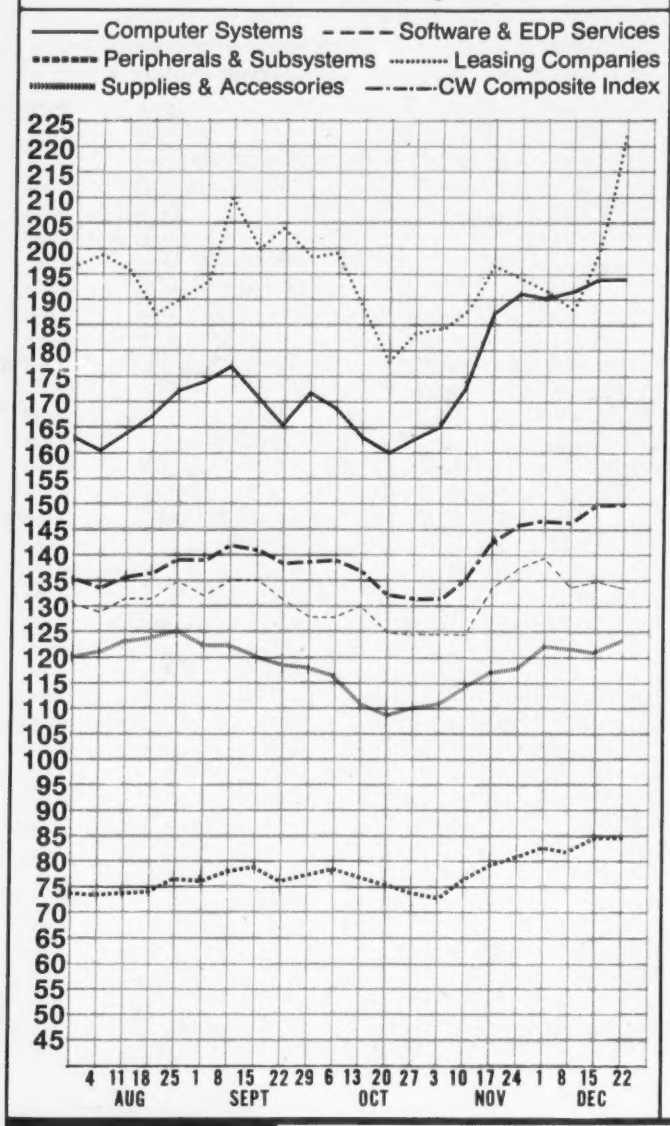

Earnings Reports

COMPUTER COMMUNICATIONS
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.14	$.13
Revenue	3,506,431	3,068,254
Tax Cred	200,000	180,000
Earnings	414,284	372,575

COMPUTER CONSOLES
Nine Months Ended Sept. 30

	1977	1976
Shr Ernd	$.30	a. . . . .
Revenue	11,972,830	$6,475,584
Spec Cred	91,500	. . . . .
Earnings	544,872	19,326

a-No share earnings are shown as preferred dividend requirements exceeded net income.

COMPUTER INSTRUMENTS
Nine Months Ended Oct. 7

	1977	a1976
bRevenue	$1,059,741	$726,718
Disc Op Loss	. . . . .	305,794
Loss	127,678	464,030

a-Restated to reflect discontinued operations.
b-From continuing operations.

DATA SYSTEMS ANALYSTS
Nine Months Ended Sept. 30

	1977	1976
Shr Ernd	$.48	$.25
Revenue	3,469,521	2,614,790
Earnings	316,059	196,612

DIGI-LOG SYSTEMS
Year Ended Sept. 30

	1977	1976
Shr Ernd	$.92	$.51
Revenue	4,054,894	2,503,951
Earnings	634,100	344,032

GREYHOUND COMPUTER
Three Months Ended Sept. 30

	1977	1976
Revenue	$11,860,000	$11,560,000
Disc Op Loss	. . . . .	1,530,000
aEarnings	1,236,000	(789,000)
9 Mo Rev	33,514,000	34,591,000
Disc Op Loss	2,856,000	1,777,000
Earnings	738,000	106,000

a-Earnings per share are not reported because all of the company's outstanding common stock is owned by Greyhound Corp.

Computerworld Sales Offices

Vice-President/Marketing
Roy Einreinhofer
Advertising Administrator
Terry Williams
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Mike Burman
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelan
Account Coordinator
COMPUTERWORLD
1212 Hearst Building
San Francisco, Calif. 94103
Phone: (415) 495-0990

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Judy Milford
Account Coordinator
COMPUTERWORLD
1434 Westwood Boulevard
Los Angeles, Calif. 90024
Phone: (213) 475-8486

Japan
Mr. Shigema Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Japan
Phone: (03) 445-6101
Telex: J2424461

United Kingdom
Tony Vickers
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London NW1 9PF
England
Phone: (01) 267-1201
Telex: UK-264737

West Germany
Hans-Jurgen Ballnath
COMPUTERWORLD GmbH
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Phone: (089) 36-40-36
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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 21, 1977

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1977 RANGE (1)	CLOSE DEC 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	22- 51	49 1/4	-1 1/8	-2.2
N	BURROUGHS CORP	55- 91	69	- 1/4	-0.3
O	COMPUTER AUTOMATION	18- 30	25 3/4	-1 1/4	-4.6
N	CONTROL DATA CORP	20- 27	26 5/8	- 3/8	-1.3
C	CRAY RESEARCH INC	15- 30	28 3/4	+ 1/4	+0.8
N	DATA GENERAL CORP	35- 54	47 5/8	-1	-2.0
N	DATAPOINT CORP	18- 41	39 1/4	+ 1/8	+0.3
N	DIGITAL EQUIPMENT	37- 53	45 1/2	+ 5/8	+1.3
N	ELECTRONIC ASSOC.	2- 3	2 3/8	- 1/4	-9.5
A	ELECTRONIC ENGINEER.	8- 13	11 3/4	-1 1/8	-8.7
O	FOUR-PHASE SYSTEMS	13- 21	20 1/4	- 1/8	-0.6
N	FOXBORO	41- 54	47 7/8	- 1/2	-1.0
O	GENERAL AUTOMATION	6- 9	7 1/4	+ 3/4	+11.5
G	GRI COMPUTER CORP	1- 1	3/4	+ 1/4	+50.0
N	HEWLETT-PACKARD CO	69- 87	72	+ 1/4	+0.3
N	HONEYWELL INC	43- 55	45 1/4	0	0.0
N	IBM	245-288	266	- 1/4	0.0
C	MANAGEMENT ASSIST	5- 10	9 1/4	- 3/4	-7.5
O	MICRODATA CORP	7- 18	11	- 1/4	-2.2
C	MODULAR COMPUTER SYS	5- 9	8 5/8	- 1/8	-1.4
N	NCR	32- 47	39	- 1/2	-1.2
C	PRIME COMPUTER INC	12- 23	22 1/4	- 3/4	-3.2
N	PERKIN-ELMER	17- 22	19 3/4	- 3/8	-1.8
N	RAYTHEON CO	16- 35	32 3/8	-1	-2.9
N	SPERRY RAND	30- 42	34 3/4	0	0.0
C	SYCOR INC	8- 20	19 3/8	- 5/8	-3.1
A	SYSTEMS ENG. LABS	5- 11	10 7/8	- 3/8	-3.3
A	WANG LABS.	10- 14	12 1/4	- 1/2	-3.9

LEASING COMPANIES

EXCH		1977 RANGE (1)	CLOSE DEC 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
C	ALANTHUS CORP	3- 5	4 1/2	0	0.0
C	BOOTHE COURIER CORP	8- 13	13 1/2	-2	-12.9
C	COMDISCO INC	10- 15	14 1/2	0	0.0
A	COMMERCE GROUP CORP	1- 3	3/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	3/4	0	0.0
M	CONTRONIC RENTAL	0- 2	1 1/8	0	0.0
A	DCL INC	1- 3	2 3/4	+ 1/8	+4.7
N	DPF INC	6- 10	8 3/4	+ 1/8	+1.4
N	ITEL	13- 22	19 1/2	- 3/8	-1.8
N	LEASCO CORP	19- 27	24	+ 1/4	+1.0
O	LEASPAC CORP	1- 2	1 1/2	+ 5/8	+71.4
C	NRG INC	1- 1	1/4	+ 1/8	+100.0
A	PIONEER TEX CORP	5- 11	5 5/8	+ 1/8	+2.2
N	U.S. LEASING	10- 16	13 3/4	- 1/8	-0.9

SOFTWARE & EDP SERVICES

EXCH		1977 RANGE (1)	CLOSE DEC 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	7/8	0	0.0
O	ANACOMP INC	7- 10	8 7/8	- 1/8	-1.3
A	APPLIED DATA RES.	5- 10	8 5/8	- 1/8	-1.4
N	AUTOMATIC DATA PROC	23- 30	28 3/4	- 3/8	-1.2
O	CCLEMAN AMERICAN COS	2- 2	1 3/4	+ 1/8	+7.6
O	COMPU-SERV NETWORK	9- 15	11 3/4	+ 1/2	+4.4
O	COMP ELECTION SYSTMS	6- 10	9 1/4	+ 1/4	+2.7
O	COMPUTER HORIZONS	1- 1	1	0	0.0
O	COMPUTER NETWORK	6- 11	10 1/8	- 1/8	-1.2
N	COMPUTER SCIENCES	7- 10	9 5/8	+ 1/8	+1.3
G	COMPUTER TASK GROUP	1- 2	1 5/8	0	0.0
O	COMPUTER USAGE	1- 3	1 1/2	0	0.0
C	COMSHARE	5- 8	7 1/4	- 1/4	-3.3
C	DATA DIMENSIONS INC	3- 5	4 1/8	+ 3/8	+10.0
O	DATATAB	1- 2	1 1/2	0	0.0
N	ELECTRONIC DATA SYS.	14- 20	15 1/2	+ 1/2	+3.3
O	INSYTE CORP	2- 3	1 1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 2	2 1/4	0	0.0
O	KEANE ASSOCIATES	3- 4	3 1/2	- 3/8	-9.6
C	KEYDATA CORP	1- 3	1 3/8	0	0.0
A	LOGICON	7- 17	12 5/8	-1 1/8	-8.1
A	MANAGEMENT DATA	1- 2	1	- 1/8	-11.1
A	NATIONAL CSS INC	10- 16	15 1/2	+ 5/8	+4.2
O	NATIONAL DATA CORP	4- 7	7	+ 1/8	+1.8
A	ON LINE SYSTEMS INC	16- 22	19 3/8	- 3/8	-1.8
N	PLANNING RESEARCH	3- 6	4 5/8	+ 1/8	+2.7
O	PROGRAMMING & SYS	1- 1	1/4	- 1/8	-33.3
O	RAPIDATA INC	2- 3	2 3/4	0	0.0
G	REYNOLDS & REYNOLD	17- 21	20 1/4	+ 1/4	+1.2
O	SCIENTIFIC COMPUTERS	1- 4	4	0	0.0
O	TYMSHARE INC	14- 23	21 5/8	-1 3/8	-5.9
A	URS SYSTEMS	4- 5	4 3/8	- 1/8	-2.7
N	WYLY CORP	1- 2	3/4	-	-7.7

PERIPHERALS & SUBSYSTEMS

EXCH		1977 RANGE (1)	CLOSE DEC 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 16	14 1/8	- 1/4	-1.7
O	ADVANCED MEMORY SYS	7- 9	8 1/8	- 1/8	-1.5
N	AMPEX CORP	8- 11	9 7/8	+ 1/2	+5.3
O	ANDERSON JACOBSON	3- 5	4 3/4	0	0.0
N	APPLIED DIG DATA SYS	10- 20	13 7/8	+ 1/2	+3.7
G	BEEHIVE INT'L	5- 12	4 7/8	- 5/8	-11.3
A	BOLT,BERANEK & NEW	7- 9	7 3/8	+ 3/8	+5.3
N	BUNKER-RAMO	8- 13	11 1/8	- 1/8	-1.1
A	CALCOMP	3- 5	2 7/8	0	0.0
O	CAMBRIDGE MEMORIES	1- 4	3 5/8	+ 1/4	+7.4
N	CENTRONICS DATA COMP	19- 30	19	- 1/4	-1.2
C	COGNITRONICS	1- 1	7/8	+	+7.1
O	COMPUTER COMMUN.	5- 8	7 3/8	+ 3/8	+5.3
O	COMPUTER CONSOLES	4- 7	4 1/4	0	0.0
A	COMPUTER EQUIPMENT	2- 4	3 1/2	+ 1/2	+16.6
O	COMPUTER TRANSCEIVER	1- 1	1 1/2	0	0.0
C	COMTEN	9- 13	10 1/2	- 3/8	-3.4
N	CONRAC CORP	19- 28	23 1/8	- 5/8	-2.6
O	DATA ACCESS SYSTEMS	4- 5	3 1/4	+ 1/4	+8.3
O	DATA 100	6- 11	10	- 1/8	-1.2
A	DATA PRODUCTS CORP	9- 19	16 5/8	- 3/8	-2.2
C	DATA TECHNOLOGY	3- 4	4 1/4	0	0.0
O	DATUM INC	1- 2	2	+ 1/8	+6.6
O	DECISION DATA COMPUT	2- 3	1 3/4	- 1/8	-6.6
O	DELTA DATA SYSTEMS	1- 1	1/2	+ 1/8	+33.3
A	DOCUMATION INC	6- 11	9 7/8	- 1/4	-2.4
O	DATARAM CORP	2- 24	22	-1	-4.3
N	ELECTRONIC M & M	4- 5	4 1/2	+ 1/4	+5.8
O	FABRI-TEK	1- 2	1	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1 5/8	0	0.0
N	HAZELTINE CORP	8- 12	10 3/8	- 1/8	-1.1
N	HARRIS CORP	28- 45	44 1/4	-1	-2.2
A	INCOTERM CORP	10- 19	18	0	0.0
O	INFOREX INC	4- 7	6 1/4	- 3/8	-5.6
O	INFORMATION INTL INC	9- 14	9	0	0.0
O	INTEL CORP	38- 57	45	0	0.0
A	LUNDY ELECTRONICS	3- 6	3 1/2	- 1/8	-3.4
O	MSI DATA CORP	6- 15	14 1/8	- 1/8	-0.8
O	MEMOREX	23- 34	30	-1 7/8	-5.8
N	MOHAWK DATA SCI	5- 8	6 1/8	0	0.0
O	PENRIL CORP	2- 5	5 3/4	0	0.0
N	PERTEC CORP	7- 11	10 7/8	- 1/8	-1.1
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	3- 5	3	- 1/4	-7.6
O	RECOGNITION EQUIP	6- 10	7 3/8	+ 1/4	+3.5
O	SCAN DATA	1- 2	7/8	- 1/8	-12.5
O	STORAGE TECHNOLOGY	10- 21	20 3/8	- 3/8	-1.8
O	T BAR INC	7- 13	12 5/8	+ 1/8	+1.0
O	TALLY CORP.	4- 6	4 1/8	+ 1/8	+3.1
A	TEC INC	7- 10	7 1/4	- 1/8	-1.6
N	TEKTRONIX INC	29- 40	36 5/8	-1 1/4	-3.3
N	TELEX	2- 3	3	0	0.0
O	WILTEK INC	1- 1	3/4	- 3/8	-33.3

SUPPLIES & ACCESSORIES

EXCH		1977 RANGE (1)	CLOSE DEC 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 8	7 1/4	+ 1/2	+7.4
O	BALTIMORE BUS FORMS	1- 4	1 7/8	+ 1/8	+7.1
A	BARRY WRIGHT	10- 17	15 7/8	+ 3/4	+4.9
O	CYBERNATICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	14- 20	18 1/2	-1 1/4	-6.3
N	ENNIS BUS. FORMS	6- 7	7	+ 5/8	+9.8
C	GRAPHIC CONTROLS	13- 18	17	+ 1/2	+3.0
N	3M COMPANY	45- 56	45 7/8	- 1/2	-1.0
O	MOORE CORP LTD	24- 37	27 1/4	+ 1/2	+1.8
N	NASHUA CORP	16- 28	19	- 1/8	-0.6
O	STANDARD REGISTER	18- 25	22	+ 1/4	+1.1
O	TAB PRODUCTS CO	9- 19	9	- 3/4	-7.6
N	UARCO	18- 22	20	- 1/2	-2.4
A	WABASH MAGNETICS	10- 15	12	- 1/4	-2.0
N	WALLACE BUS FORMS	17- 21	20 1/8	0	0.0

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